ARMY SERVICE FORCES MANUAL **M365-7**

CIVIL AFFAIRS HANDBOOK

THE PHILIPPINES

SECTION 7: AGRICULTURE

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HEADQUARTERS, ARMY SERVICE FORCES 1945

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Headquarters, Army Service Forces, 1945

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M900 up	Equipment, Matériel, Housing and Construction

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By Command of General Somervell

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INTRODUCTION

Purposes of the Civil Affairs Handbook

The basic purposes of civil affairs officers are (1) to assist the Commanding General by quickly establishing those orderly conditions which will contribute most effectively to the conduct of military operations, (2) to reduce to a minimum the human suffering and the material damage resulting from disorders, and (3) to create the conditions which will make it possible for civilian agencies to function effectively.

The preparation of Civil Affairs Handbooks is a part of the effort to carry out these responsibilities as efficiently and humanely as possible. The Handbooks do not deal with plans or policies (which will depend upon changing and unpredictable developments). It should be clearly understood that they do not imply any given official program of action. They are rather ready reference source books containing the basic factual information needed for planning and policy making.

This study on Agriculture in the Philippine Islands was prepared for the Military Government Division, Office of the Provost Marshal General by the Office of Foreign Agricultural Relations, United States Department of Agriculture.

Officers using this material are requested to make suggestions and criticisms indicating the revisions or additions which would make this material more useful for their purposes. These criticisms should be sent to the Chief of the Liaison Studies Branch, Military Government Division, PMGO, 2809 Munitions Building, Washihgton 25, D. C.

CIVIL AFFAIRS HANDBOOKS

TOPICAL OUTLINE

1. Geographical and Social Background
2. Government and Administration
3. Legal Affairs
4. Government Finance
5. Money and Banking
6. Natural Resources
7. Agriculture
8. Industry and Commerce
9. Labor
10. Public Works and Utilities
11. Transportation Systems
12. Communications
13. Public Health and Sanitation
14. Public Safety
15. Education
16. Public Welfare
17. Cultural Institutions
18. Japanese Administration of Occupied Areas

This study on Agriculture in the Philippine Islands was prepared for the Military Government Division, Office of the Provost Marshal General, by the Office of Foreign Agricultural Relations, United States Department of Agriculture.

Table of Contents

Page

PART I. GENERAL FACTORS AFFECTING AGRICULTURE 1

1. Location and Area 1
2. Population 1
3. Climate 4
4. Topography 8
5. Land Resources and Utilization 9
6. Soils 10

PART II. PRE-WAR AGRICULTURAL PRODUCTION 15

1. Importance of Agriculture 15
2. The Available Agricultural Data 15
3. General Characteristics of Philippine Agriculture 16
    a. Crop Raising the Predominant Farm Enterprise 16
    b. Important Crops 16
    c. Agricultural Regions 20
    d. Size of Farm 23
    e. Farm Implements and Tools 27
    f. Fertilizers 29
    g. Irrigation 30
    h. Yields 31
4. Subsistence Crops 32
    a. Palay 32
    b. Corn 44
    c. Root Crops 47
    d. Legumes 48
    e. Fruits 48
    f. Vegetables 51
5. Commercial Crops 52
    a. Sugarcane 52
    b. Coconuts 59
    c. Abaca 64
    d. Tobacco 66
    e. Maguey 70
    f. Cotton 70
    g. Kapok 71
    h. Coffee 71
    i. Rubber 72
    j. Cacao 72
    k. Derris 73
    l. Lumbang 73
    m. Ramie 74

Table of Contents (Cont'd)

		Page
	6. Animal Husbandry	75
	a. Work Animals	75
	b. Meat Producing Animals	78
	c. Poultry	81
	d. Dairying	84
	e. Livestock Diseases and Parasites	84
	f. Livestock Improvement	85
PART III.	AGRICULTURAL FOODSTUFFS	86
	1. The Diet Pattern	86
	2. Diet Composition	86
	3. Foodstuffs Imported and Exported	88
	4. Average Pre-war Consumption of Principal Agricultural Foodstuffs	90
	5. Surpluses and Deficits by Regions	93
PART IV.	SOCIAL CONDITIONS PERTAINING TO PHILIPPINE AGRICULTURE	96
	1. Land Tenure	96
	2. Historical Development of Land Tenure	98
	3. Types of Tenancy	101
	4. Government Measures to Improve the Economic Conditions of the Small Farmer, Especially the Kasamas	103
	a. The Rice Share Tenancy Act	103
	b. Government Purchase of Landed Estates	107
	c. Government-Sponsored Agridultural Colonization	107
PART V.	GOVERNMENT AGRICULTURAL SERVICES BEFORE THE WAR	112
	1. The Department of Agriculture and Commerce	112
	2. Agricultural Education	113
	3. The National Rice and Corn Corporation	114
PART VI.	CHANGES SINCE THE JAPANESE OCCUPATION	115
	1. Factors Which have Affected Agricultural Production and Food Supply	115
	a. Reduction in Livestock Numbers	115
	b. Farmer Resistance	115
	c. Elimination of Interisland Shipping	116
	d. Disturbed Conditions	116

Table of Contents (Cont'd)

Page

2. Changes in Agricultural Production 116
    a. Rice 116
    b. Corn 117
    c. Root Crops 117
3. Cotton 118
4. Sugarcane and Sugar 118
5. Coconuts 118
6. Abaca 119
7. Tobacco 119

APPENDIX 120

Table 36. PRINCIPAL SUBSISTENCE CROPS: Total acreage and production, 1931-1940, according to estimates of the Division of Statistics 120

" 37. PRINCIPAL COMMERCIAL CROPS: Total acreage and production, 1931-1940, according to estimates of the Division of Statistics 121

" 38. SUGAR: Sugar centrals and refineries, 1941 122

" 39. FOREIGN TRADE: Imports of principal agricultural products, 1935-1940 124

" 40. FOREIGN TRADE: Exports of principal agricultural products, 1935-1940 133

" 41. FOODSTUFFS: An estimate of the supply of cereals, root crops and legumes available from local production, compared with requirements based on average consumption for the Philippines, by regions, 1938 136

" 42 Conversion factors for weights and measures commonly used in the Philippines 146

SELECTED LIST OF REFERENCES 147

List of Tables

		Page
Table 1.	POPULATION: Area, population and population density by provinces and regions, 1939	2
" 2.	POPULATION: Farms and cultivated land by citizenship of farm operator, by provinces, 1939	3
" 3.	POPULATION: Gainful Workers (Male) 10 years old and over in different occupation groups. 1939	5
" 4.	CLIMATE: Representative Temperature Data	6
" 5.	CLIMATE: Representative Precipitation Data, by type of rainfall season	7
" 6.	LAND RESOURCES	11
" 7.	LAND RESOURCES: Utilization of farm area, by regions, 1939	12
" 8.	PRINCIPAL CROPS: Reported acreage, 1938	17
" 9.	SUBSISTENCE CROPS: Percent of the total cultivated area estimated to be occupied by each of the major crops, 1938, by regions and provinces	21
" 10.	COMMERCIAL CROPS: Percent of the total cultivated area estimated to be occupied by each of the important commercial crops, 1938, by regions, and provinces	22
" 11.	AVERAGE SIZE OF FARM, 1939	24
" 12.	SIZE OF FARM: Percent distribution of the cultivated land and percent distribution of farms according to the size of farm, 1939	26
" 13.	FARM IMPLEMENTS: Number of plows, harrows, carts and sleds reported, by provinces, 1939	28
" 14.	PALAY: Average yields of different countries	31
" 15.	PRINCIPAL SUBSISTENCE CROPS: Total acreage, by provinces and regions, 1938	33a
" 16.	PRINCIPAL SUBSISTENCE CROPS: Production, by regions and provinces, 1938	34

Page

Table 17. PALAY: The most general planting and harvesting dates, by regions 36

" 18. RICE: Monthly arrivals and shipments of rice to and from Manila, by kind of transportation: 1940 41

" 19.. RICE: Arrivals and shipments to and from Manila, by kind of transportation, by provinces, 1940 42

" 20. CORN: The most general planting and harvesting dates, by regions 46

" 21. FRUIT: Total number of trees and production for year ending June 30, 1938 49

" 22. PRINCIPAL COMMERCIAL CROPS: Total acreage, by provinces and regions, 1938 54

" 23. PRINCIPAL COMMERCIAL CROPS: Production, by regions and provinces, 1938 55

" 24. SUGAR: Sugarcane and sugar production, 1921-40 58

" 25. COCONUTS: Number of trees, and production of copra and homemade oil, by provinces and regions 63a

" 26. LIVESTOCK: Number of farms, work animals, carabaos and cattle, by provinces and regions, census of 1939 76

" 27. LIVESTOCK: Number of hogs, horses and goats, by provinces and regions, census of 1939 77

" 28. LIVESTOCK: Number of animals slaughtered, 1938 79

" 29. LIVESTOCK: Number of chickens, ducks, geese and turkeys, by provinces and regions, census of 1939 82

" 30. NUTRITION: Average composition of the diet of families of laborers 87

" 31. FOREIGN TRADE: Summary of imports and exports of agricultural products and foodstuffs, average 1935-1939 89

Page

Table 32. FOODSTUFFS: A summary of the supply of cereals, root crops and legumes estimated available from local production, compared with requirements based on average consumption for the Philippines, on a calory basis, by regions, 1938 92

" 33. FARM TENURE: Number of farms and percent of farms under different categories of tenure, by provinces, 1929 97

" 34. FARM TENURE: Percent of all cultivated land farmed under different categories of tenure, by provinces, 1939 99

" 35. FARM TENURE: Number of farms by size and percent of farms in different categories of tenure, 1939 104

" 36. PRINCIPAL SUBSISTENCE CROPS: Total acreage and production, 1931-1940, according to estimates of the Division of Statistics 120

" 37. PRINCIPAL COMMERCIAL CROPS: Total acreage and production, 1931-1940, according to estimates of the Division of Statistics 121

" 38. SUGAR: Sugar centrals and refineries, 1941 122

" 39. FOREIGN TRADE: Imports of principal agricultural products, 1935-1940 124

" 40. FOREIGN TRADE: Exports of principal agricultural products, 1935-1940 133

" 41. FOODSTUFFS: An estimate of the supply of cereals, root crops and legumes available from local production, compared with requirements based on average consumption for the Philippines, by regions, 1938 136

" 42. Conversion factors for weights and measures commonly used in the Philippines 146

MAPS AND CHARTS

Opposite Page

Figure 1. Drainage, Transportation and Political ------------ xii

" 2. Identification -- 1

" 3. Density of Population, 1939 ---------------------- 2

" 4. Rainfall by Seasons ------------------------------- 6

" 5. Relief Map -- 8

" 6. Utilization of Farm Land, by Provinces, 1939 ----- 12

" 7. Type of Farming Regions Based on Use of Cultivated Land, 1939 --------------------------- 16

" 8. Approximate Percent of Total Cultivated Area in Major Food Crops, by Regions, 1938 ------- 20

" 9. Approximate Percent of Total Cultivated Area in the Important Commercial Crops, by Regions, 1938 -- 22

" 10. Total Area and Cultivated Area Per Farm, 1939 ---- 26

" 11. Palay (Unmilled Rice) --------------------------- 32

" 12. Corn -- 44

" 13. Sweet Potatoes ----------------------------------- 48

" 14. Sugarcane -- 52

" 15. Coconuts --- 59

" 16. Abaca (Manila Hemp)------------------------------- 64

" 17. Tobacco -- 66

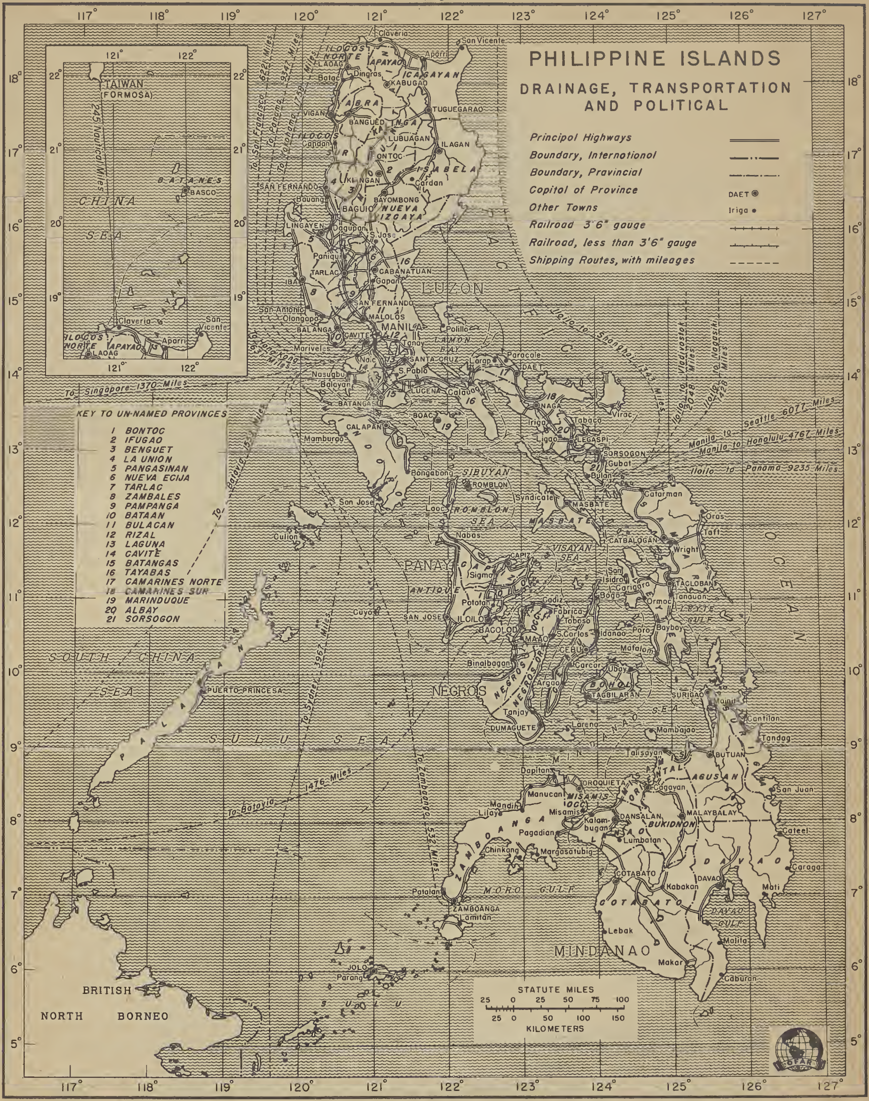
" 18. Population in Relation to Livestock, 1938 -------- 80

" 19. Food Supply of Cereals, Root Crops, and Legumes Available from Local Production Compared with Requirements Based on Average Consumption of these Commodities for the Philippines, by Regions, 1938 ------------------------------------ 94

" 20. Tenants: Percent of Total Farm Operators, 1939 -- 98

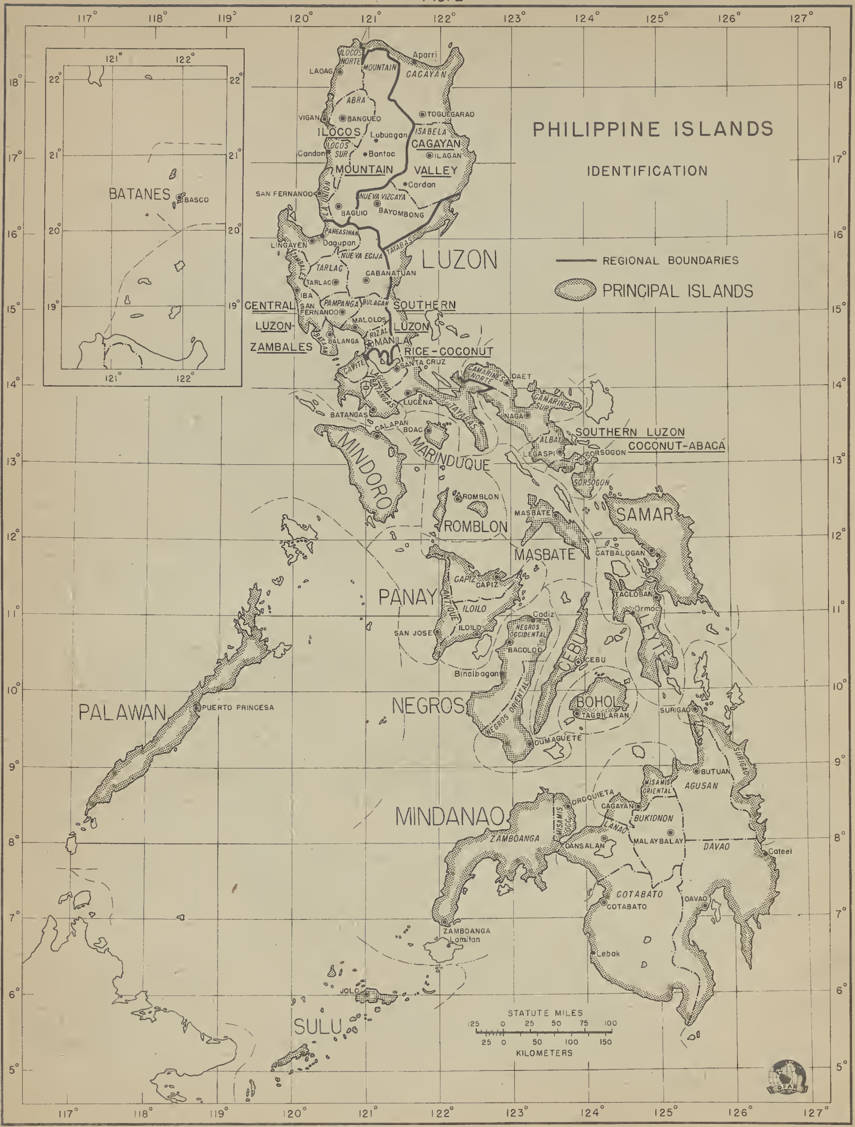
" 21. Percentage of Farms in Each Type Group by Tenure of Farm Operator, 1939. ------------------- 99

FIG. 1


PHILIPPINE ISLANDS
DRAINAGE, TRANSPORTATION AND POLITICAL
Principol Highways
Boundary, Internotionol
Boundary, Provincial
Copitol of Province
DAET
Other Towns
Iriga
Railroad 3'6" gauge
Railroad, less than 3'6" gauge
Shipping Routes, with mileages
KEY TO UN-NAMED PROVINCES
1 BONTOC
2 IFUGAO
3 BENGUET
4 LA UNION
5 PANGASINAN
6 NUEVA ECIJA
7 TARLAC
8 ZAMBALES
9 PAMPANGA
10 BATAAN
11 BULACAN
12 RIZAL
13 LAGUNA
14 CAVITE
15 BATANGAS
16 TAYABAS
17 CAMARINES NORTE
18 CAMARINES SUR
19 MARINDUQUE
20 ALBAY
21 SORSOGON
STATUTE MILES
KILOMETERS
TAIWAN (FORMOSA)
BATANES
BASCO
CHINA SEA
245 Nautical Miles
LUZON
MANILA
PANAY
NEGROS
MINDANAO
SOUTH CHINA SEA
SULU SEA
MINDANAO SEA
PACIFIC OCEAN
BRITISH NORTH BORNEO
To Singapore 1370 Miles
To Batavia 1476 Miles
To Sydney 3567 Miles
To Zamboanga 533 Miles
Manila to Seattle 6077 Miles
Manila to Honolulu 4767 Miles
Iloilo to Panama 9235 Miles
Iloilo to Shanghai 1343 Miles
Iloilo to Vladivostok 2048 Miles
Iloilo to Nagasaki 1428 Miles
To San Francisco 6221 Miles
To Panama 9347 Miles
To Yokohama 1758 Miles
To Hongkong 636 Miles
PUERTO PRINCESA
ZAMBOANGA
JOLO
CEBU
ILOILO
BACOLOD
TACLOBAN
DAVAO
COTABATO
LEGASPI
NAGA
BAGUIO
VIGAN
LAOAG
APARRI
TUGUEGARAO
ILAGAN
SAN FERNANDO
LINGAYEN
TARLAC
CABANATUAN
MALOLOS
CAVITE
BATANGAS
LUCENA
CALAPAN
ROMBLON
MASBATE
CATBALOGAN
CAPIZ
SAN JOSE
DUMAGUETE
TAGBILARAN
SURIGAO
BUTUAN
MALAYBALAY
DANSALAN
OROQUIETA
SORSOGON
DAET
BOAC
117° 118° 119° 120° 121° 122° 123° 124° 125° 126° 127°
5° 6° 7° 8° 9° 10° 11° 12° 13° 14° 15° 16° 17° 18°

RESTRICTED

FIG. 2



U.S DEPARTMENT OF AGRICULTURE

NEG.533 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

RESTRICTED

AGRICULTURE AND AGRICULTURAL FOODSTUFFS

PART I. GENERAL FACTORS AFFECTING AGRICULTURE

1. Location and Area

The Philippines consist of a group of 7,083 islands, of which 2,441 are large enough to have names and 44 have an area of 100 or more square kilometers each. Fourteen of these are usually considered the principal islands.

The total land and sea area covered by the Philippines is shaped roughly like a triangle, which lies approximately within the degrees of latitude 5° and 21° North and the degrees of longitude 117° and 127° West, (Figure 1). The northernmost island, Yami Island, is 65 miles from the mainland of Formosa; whereas the southernmost island, Salway, is only 30 miles east of Borneo. The total area of the islands themselves is reported to be 299,504 square kilometers (115,638 square miles).* This is approximately 5,000 square miles less than the area of the British Isles, roughly three-fourths the size of Japan proper, and a little more than the combined areas of New York, New Jersey, Pennsylvania, and Delaware.

For administrative purposes the islands have been divided into 49 provinces and a special district, the City of Manila. Four of the larger islands, Luzon, Panay, Negros, and Mindanao, each contain two or more provinces. Each of the other principal islands, together with nearby small islands, comprises only one province. For the purposes of this study, the islands are further divided into 19 agricultural regions, having similar agricultural characteristics. Provinces and regions are shown on the outline map, figure 2.

2. Population

The total population, according to the census of 1939, was 16,000,303. About 47 percent inhabited the single island of Luzon. Other densely populated islands are Panay, Cebu, Bohol, and Leyte. The islands of Mindoro, Samar, Palawan, Masbate and most of Mindanao are less densely populated. (Table 1). A graphic representation of relative densities is given in figure 3.

Filipinos of Malay and Indonesian extraction, who are adherents of the Christian religion, constitute over 93 percent of the total population. The rest are mainly Mohammedan or pagan. Foreign elements

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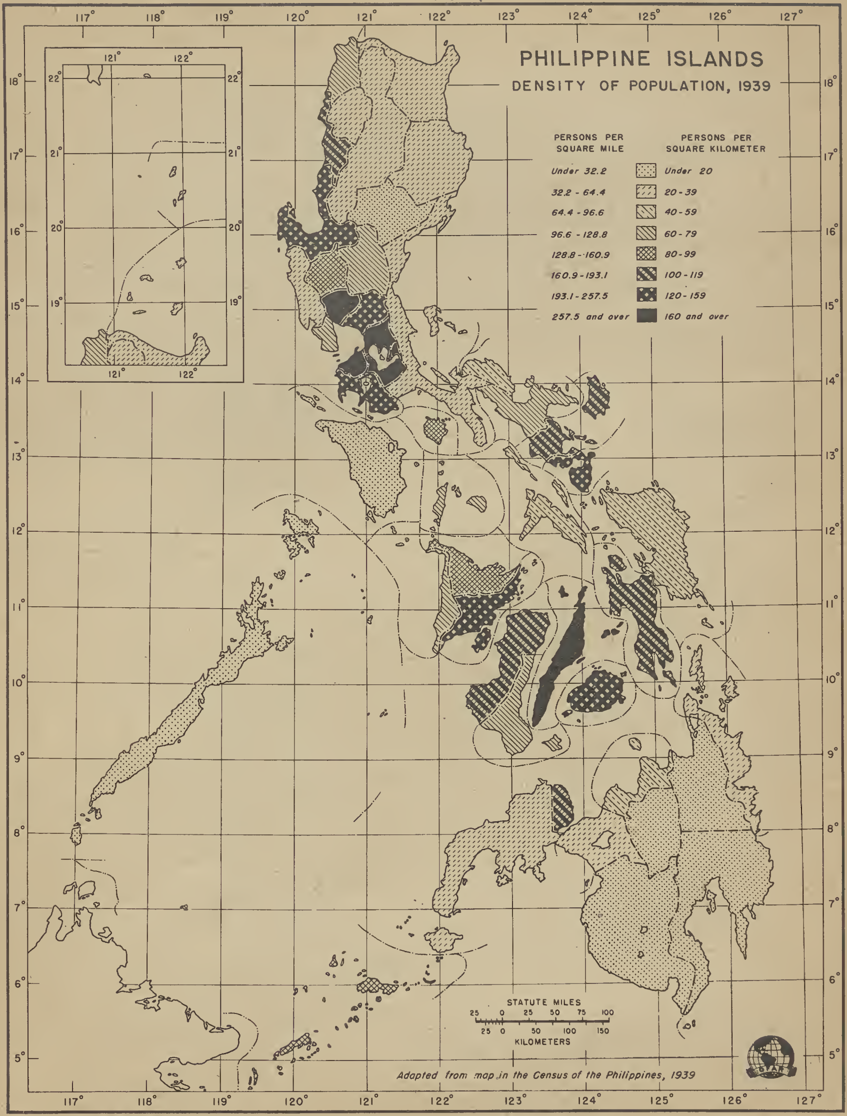
* Conversion factors for weights and measures commonly used in the Philippines are given in Table 42, page 146.

Table 1 .- POPULATION: Area, population and population density by provinces and regions, 1939 1/

	Area 2/		Population:	Density	
	Sq. km.	Sq. Mi. 3/		Person Per Sq. Km 4/	Persons Per sq. Mi. 4/
Luzon: Ilocos-Mountain Region	25,391	9,804	1,101,473	43	112
Abra	3,810	1,471	87,780	23	60
Ilocos Norte	3,387	1,308	237,586	70	182
Ilocos Sur	2,685	1,037	271,532	101	262
La Union	1,373	530	207,701	151	392
Mountain Province	14,136	5,458	296,874	21	54
Luzon: Cagayan Valley Region	26,332	10,166	590,639	22	58
Cagayan	8,988	3,470	292,270	33	84
Isabela	10,540	4,069	219,864	21	54
Nueva Vizcaya	6,804	2,627	78,505	12	30
Central Luzon-Zambales	25,625	9,894	3,392,484	132	342
Bataan	1,339	517	85,538	64	165
Bulacan	2,644	1,021	332,807	126	326
Manila City	37	14	623,492	16,833	43,601
Nueva Ecija	5,492	2,120	416,762	76	197
Pampanga	2,142	827	375,281	175	454
Pangasinan	5,234	2,021	742,475	142	367
Rizal	2,049	791	444,805	217	562
Tarlac	3,042	1,175	264,379	87	225
Zambales	3,646	1,408	106,945	29	76
Southern Luzon Rice-Coconut Region	17,536	6,770	1,318,673	75	119
Batangas	3,086	1,191	442,034	143	371
Cavite	1,289	498	238,581	185	480
Laguna	1,204	465	279,505	232	601
Tayabas	11,957	4,616	358,553	30	78
Southern-Luzon Coconut-Abaca Region	13,547	5,230	1,164,137	19	223
Albay	4,010	1,548	432,465	108	279
Camarines Norte	2,147	829	98,324	46	119
Camarines Sur	5,336	2.060	385,695	72	187
Sorsogon	2,054	793	247,653	121	312
Panay	12,394	4,785	1,348,721	109	202
Antique	2,679	1,034	199,414	74	193
Capiz	4,410	1,703	405,285	92	238
Iloilo	5,304	2,048	744,022	140	363
Negros	13,057	5,041	1,219,538	93	242
Occidental Negros	7,741	2,989	824,858	107	276
Oriental Negros	5,316	2,053	394,680	74	192
Mindoro	10,078	3,891	131,569	13	34
Romblon	1,327	512	99,367	75	194
Cebu	4,869	1,880	1,068,078	219	568
Bohol	4,078	1,575	491,608	121	312
Samar	13,751	5,309	546,306	40	103
Palawan	14,746	5,693	93,673	6	16
Sulu	2,813	1,086	247,117	88	228
Batanes	198	76	9,512	48	125
Masbate	4,070	1,571	182,483	45	116
Marinduque	920	355	81,768	89	230
Leyte	7,987	3,084	915,853	115	297
Mindanao	98,693	38,106	1,997,304	20	52
Agusan	10,671	4,120	99,023	9	24
Bukidnon	8,038	3,104	57,561	7	19
Cotabato	22,968	8,868	298,935	13	34
Davao	19,499	7,529	292,600	15	39
Lanao	6,668	2,575	243,437	37	95
Occidental Misamis	2,077	802	210,057	101	262
Oriental Misamis	3,917	1,512	213,812	55	141
Surigao	7,976	3,079	225,895	28	73
Zamboanga	16,879	6,517	355,984	21	55
TOTAL	297,412	114,829	16,000,303	54	139

1/ Source: Yearbook of Philippine Statistics, 1940, p. 7. (Population figures taken from the 1939 census)
2/ Excluding Area of Lakes.
3/ Sq. Km. X .3861 = Sq. Mi.
4/ Calculated.

FIG. 3



PHILIPPINE ISLANDS

DENSITY OF POPULATION, 1939

Adapted from map in the Census of the Philippines, 1939

U. S. DEPARTMENT OF AGRICULTURE

NEG. 390 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

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Table 2.-POPULATION: Farms and cultivated land by citizenship of farm operator, by provinces, 1939 1/

	Filipinos		Japanese		Chinese		Americans		Spaniards		Others	
	No. of Farms	Cultivated Land	No. of Farms	Cultivated Land	No. of Farms	Cultivated Land	No. of Farms	Cultivated Land	No. of Farms	Cultivated Land	No. of Farms	Cultivated Land
		(Hectares)		(Hectares)		(Hectares)		(Hectares)		(Hectares)		(Hectares)
Luzon: Ilocos-Mountain Region												
Abra	13,327	15,540					1	1			1	2
Ilocos Norte	31,234	35,646										
Ilocos Sur	27,161	33,757			1						1	
La Union	25,739	33,225										
Mountain Province	36,047	33,351	54	56	2	19	20	20	2	4	2	1
Luzon: Cagayan Valley Region												
Cagayan	36,559	78,802			1		1	2				
Isabela	32,714	80,041			1	2			3		1	1
Nueva Vizcaya	10,113	18,860					1	3				
Central Luzon-Zambales												
Bataan	6,302	15,587			1	120					2	565
Bulacan	36,013	72,698			1	3						
Manila City	42	96			14	7			1			
Nueva Ecija	78,315	221,923			3	33	1					
Pampanga	23,626	88,016							2	770		
Pangasinan	86,615	151,916										
Rizal	14,055	23,968	15	5	23	9	33	11	8	8	15	5
Tarlac	28,633	84,895			6	12	4	3	8	2,347		
Zambales	12,155	20,711	1	1	7	14	1		1	4		
Southern Luzon Rice-Coconut Region												
Batangas	50,316	106,702										
Cavite	22,461	52,913					2	1				
Laguna	25,715	84,456	1	4	1							
Tayabas	52,853	187,319	1	18	17	73	2	151	1	6		
Southern Luzon Coconut-Abaca Region												
Albay	44,252	133,672			8	38			1	392		
Camarines Norte	10,007	38,297	1	1	1	2	2	51				
Camarines Sur	35,812	131,184			9	1,124			1	285		
Sorsogon	31,657	108,237			8	116	20	422	3	1,822		
Panay												
Antique	23,660	45,889			1	11					1	1
Capiz	43,525	89,128							2	163		
Iloilo	66,913	163,468					2	1				
Negros												
Occidental	35,894	198,494					1	2			1	83
Oriental	47,434	74,789	1	5	2	704			2	428	1	1
Mindoro	16,266	55,171			2	44	1	200	2	699		
Romblon	14,521	36,445										
Cebu	121,536	138,827	1	9	7	52	1	1	3	272		
Bohol	63,385	96,441			1	2	1	37	1	40		
Samar	63,184	155,204			8	183	2	158				
Palawan	11,301	19,498			1	35	2	138				
Sulu	20,381	47,887			2	20	1	271				
Batanes	1,724	1,340										
Masbate	17,711	59,437			4	29	1		5		2	
Marinduque	9,931	32,709										
Leyte	100,790	201,705			3	1			1	300		
Mindanao												
Agusan	12,072	36,976										
Bukidnon	6,558	19,451			3	2,287						
Cotabato	25,003	44,298	1	6	6	1,814	4	37	4	489		
Davao	23,409	111,579	2,722	34,388	86	1,151	25	3,549	8	563	1	155
Lanao	24,522	70,434			2	37		981				
Occidental Misamis	25,645	54,848			4	8		104				
Oriental Misamis	22,589	67,212			1	1		20				
Surigao	28,980	80,224	1	2	1	4						
Zamboanga	32,792	107,117	8	1,177	61	718	11	3,350	3	12	2	102
Total	1,631,379	3,890,375	2,807	35,669	229	8,673	150	9,775	61	8,606	30	916

1/ Source: Census of Philippines 1939, Vol.II

Note: 1 Hectare = 2.471 Acres

in the population include Chinese, Japanese, Americans, and Europeans largely Spanish. Nationals of each of these foreign groups owned and cultivated a certain amount of land, which is shown in table 2, by provinces, for 1939.

Of the gainful workers (male) of 10 years of age and over, 70.7 percent were classified in 1939 as agricultural workers. (Table 3) Some of these laborers, however, also were partially employed in other work.

3. Climate

a. Temperature. The Philippine Islands lie within the Tropics. Except at points of higher elevation, annual mean temperatures are around 80° Fahrenheit. Mean monthly temperatures, also, stay within a few degrees of this figure except in the northern part of Luzon, where the variations are slightly greater. Indeed, temperatures throughout the year are remarkably uniform, the coldest temperature of the year commonly being not more than 20 to 30 degrees lower than the hottest. Where there is a pronounced dry season, the hottest temperatures come during April, May, and June, the temperatures moderating slightly when rains begin. (Table 4). Points of higher elevation, like Baguio, are distinctly cooler throughout the year.

b. Precipitation. Rainfall, in contrast with temperature, varies greatly in different parts of the Philippines, due to the combined influences of topography and air stream direction. Winds blowing from a northerly direction, between October and January, and from an easterly direction, between February and April, bring moisture which is deposited during these months over a greater part of the eastern and central areas. However, high mountain barriers on certain islands prevent much of this moisture from reaching their western portions, which may experience a dry season during this period. Monsoon winds, coming mainly from a southwesterly direction, and typhoons, bring moisture to all regions from May to November or December. (Table 5)

Based on these differences, four types of rainfall regions have been defined, which may be described as follows: a first type, having two pronounced rainfall seasons, a dry winter and spring, and a wet summer and autumn; a second type, having no dry season but having a very pronounced maximum rain period in the winter months; a third type, having no very pronounced maximum rain period, but having a short dry season during the winter or early spring, lasting from one to three months; and a fourth type, having no very pronounced maximum rain period and having no dry season. The parts of the Philippines where these four types of rainfall season prevail are shown in figure 4.

Table 3 .-POPULATION: Gainful Workers (Male) 10 years old and over in different occupation groups. 1939

Occupation Group	Number	Percent distribution
Agriculture	2,981,551	70.7
Manufacturing and mechanical industries	333,976	7.9
Transportation and communication	202,449	4.8
Fishing	175,841	4.2
Trade	171,099	4.0
Domestic and personal service	123,508	2.9
Professional service	65,438	1.5
Public service (not elsewhere classified)	48,984	1.2
Mining and quarrying	46,625	1.1
Clerical	44,904	1.1
Forestry and hunting	24,903	0.6
Total	4,219,278	100.0

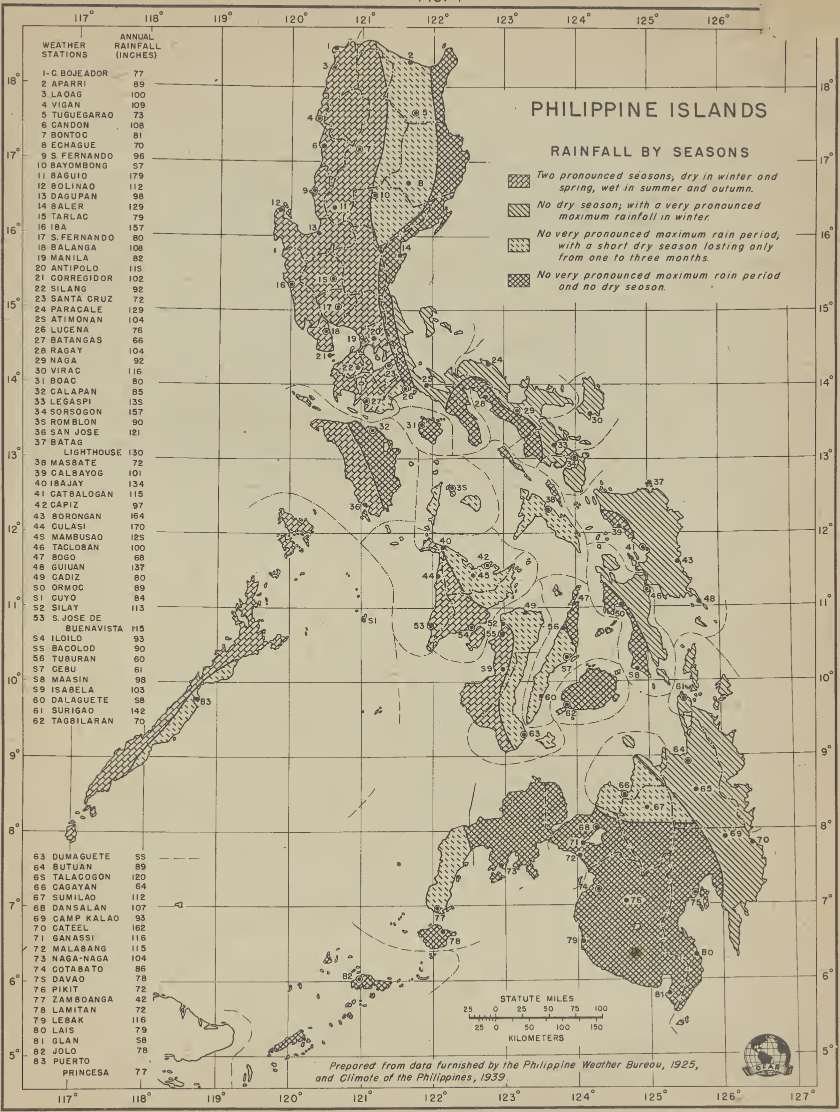
Source: Yearbook of Philippine Statistics: 1940 (Taken from Census of the Philippines, 1939).

Table 4 .- CLIMATE: Representative Temperature Data 1/

Island and Station	Province	Number of years Averaged	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
			(Average monthly and yearly temperatures)												
Luzon															
Aparri	Cagayan	16	73.8	74.5	77.4	80.5	82.3	83.6	82.7	82.3	81.6	80.0	77.8	75.3	79.3
Dagupan	Pangasinan	16	79.2	79.8	82.6	85.1	85.1	84.6	82.4	82.2	82.2	82.5	81.1	79.8	82.2
Manila City	Manila	53	77.6	78.4	80.7	83.3	84.0	82.8	81.3	81.1	81.0	80.8	79.5	78.2	80.7
Naga	Camarines Sur	10	77.2	77.0	78.6	80.6	82.8	82.8	82.2	82.6	81.9	80.6	79.3	78.1	80.3
Gubat	Sorsogon	11	78.4	78.6	79.9	81.9	83.1	83.1	82.4	83.1	82.6	81.3	80.4	79.3	81.2
Legaspi	Albay	16	78.6	78.6	80.2	82.1	83.2	82.8	82.2	82.3	81.7	81.5	80.6	79.6	81.1
Masbate															
Masbate	Masbate	11	79.2	79.9	81.5	83.5	84.7	84.4	83.1	83.1	82.8	82.6	81.5	80.4	82.2
Leyte															
Tacloban	Leyte	15	77.9	77.9	79.3	80.8	81.9	81.3	81.1	81.7	81.3	80.4	79.5	78.8	80.2
Panay															
Iloilo City	Iloilo	16	79.2	79.5	81.2	83.2	83.2	81.8	80.7	80.6	80.4	81.0	80.4	79.9	80.9
Cebu															
Cebu	Cebu	16	79.0	79.0	80.2	82.0	83.0	82.4	81.7	81.8	81.5	81.3	80.7	80.0	81.0
Palawan															
Puerto Princesa	Palawan	14	78.8	78.7	80.0	81.6	81.7	81.0	80.7	80.7	80.5	80.9	79.8	79.4	80.2
Mindanao															
Surigao	Surigao	16	78.4	78.2	79.0	80.9	81.3	81.7	82.0	82.6	82.4	81.4	80.1	79.0	80.5
Cagayan	Oriental Misamis	11	78.1	78.4	79.7	81.5	82.4	81.3	81.1	81.1	81.0	80.2	79.9	78.9	80.3
Butuan	Agusan	12	77.2	77.7	78.8	80.6	82.6	81.9	81.7	81.7	81.3	80.4	79.0	78.1	80.1
Zamboanga	Zamboanga	16	79.5	79.4	79.8	80.2	80.4	79.8	79.6	79.7	79.6	79.6	79.8	79.9	79.8
Cotabato	Cotabato	10	81.0	81.7	82.8	83.3	82.9	81.9	80.8	80.8	81.1	81.7	81.7	81.3	81.8

1/ Source: Weather Bureau, Statistics Division, Index of Climatic Data

FIG. 4


PHILIPPINE ISLANDS
RAINFALL BY SEASONS
▨ Two pronounced seasons; dry in winter and spring, wet in summer and autumn.
▨ No dry season; with a very pronounced maximum rainfall in winter.
▨ No very pronounced maximum rain period; with a short dry season lasting only from one to three months.
▨ No very pronounced maximum rain period and no dry season.
STATUTE MILES
25 0 25 50 75 100
25 0 50 100 150
KILOMETERS
117° 118° 119° 120° 121° 122° 123° 124° 125° 126° 127°
18° 17° 16° 15° 14° 13° 12° 11° 10° 9° 8° 7° 6° 5°
OFAR

WEATHER STATIONS	ANNUAL RAINFALL (INCHES)
1-C. BOJEADOR	77
2 APARRI	89
3 LAOAG	100
4 VIGAN	109
5 TUGUEGARAO	73
6 CANDON	108
7 BONTOC	81
8 ECHAGUE	70
9 S. FERNANDO	96
10 BAYOMBONG	57
11 BAGUIO	179
12 BOLINAO	112
13 DAGUPAN	98
14 BALER	129
15 TARLAC	79
16 IBA	157
17 S. FERNANDO	80
18 BALANGA	108
19 MANILA	82
20 ANTIPOLO	115
21 CORREGIDOR	102
22 SILANG	92
23 SANTA CRUZ	72
24 PARACALE	129
25 ATIMONAN	104
26 LUCENA	76
27 BATANGAS	66
28 RAGAY	104
29 NAGA	92
30 VIRAC	116
31 BOAC	80
32 CALAPAN	85
33 LEGASPI	135
34 SORSOGON	157
35 ROMBLON	90
36 SAN JOSE	121
37 BATAG LIGHTHOUSE	130
38 MASBATE	72
39 CALBAYOG	101
40 IBAJAY	134
41 CATBALOGAN	115
42 CAPIZ	97
43 BORONGAN	164
44 CULASI	170
45 MAMBUSAO	125
46 TACLOBAN	100
47 BOGO	68
48 GUIUAN	137
49 CADIZ	80
50 ORMOC	89
51 CUYO	84
52 SILAY	113
53 S. JOSE DE BUENAVISTA	115
54 ILOILO	93
55 BACOLOD	90
56 TUBURAN	60
57 CEBU	61
58 MAASIN	98
59 ISABELA	103
60 DALAGUETE	58
61 SURIGAO	142
62 TAGBILARAN	70
63 DUMAGUETE	55
64 BUTUAN	89
65 TALACOGON	120
66 CAGAYAN	64
67 SUMILAO	112
68 DANSALAN	107
69 CAMP KALAO	93
70 CATEEL	162
71 GANASSI	116
72 MALABANG	115
73 NAGA-NAGA	104
74 COTABATO	86
75 DAVAO	78
76 PIKIT	72
77 ZAMBOANGA	42
78 LAMITAN	72
79 LEBAK	116
80 LAIS	79
81 GLAN	58
82 JOLO	78
83 PUERTO PRINCESA	77

Prepared from data furnished by the Philippine Weather Bureau, 1925, and Climate of the Philippines, 1939.

U.S. DEPARTMENT OF AGRICULTURE

NEG. 405 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

Table 5 .-CLIMATE: Representative Precipitation Data, by Type of Rainfall Season

(Average monthly and yearly rainfall)

Weather Station	Island	Period	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
		Years	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.
							FIRST TYPE								
Laoag	Luzon	1908-1937	0.2	0.3	0.2	0.4	8.4	11.5	24.8	27.3	17.3	7.3	1.5	0.6	99.8
Baguio City	Luzon	1902-1937	0.9	0.7	1.7	4.3	15.8	17.2	42.3	45.7	28.1	15.1	4.9	2.0	178.7
Dagupan	Luzon	1902-1937	0.4	0.5	0.9	2.9	8.8	12.9	23.1	21.5	15.8	7.1	3.1	0.9	97.9
Manila City	Luzon	1865-1937	1.0	0.5	0.7	1.2	5.1	9.9	17.0	16.6	14.4	7.7	5.6	2.5	82.2
Batangas	Luzon	1908-1937	1.0	0.7	0.4	1.1	4.3	6.2	12.0	10.4	10.9	7.5	7.2	4.0	65.6
San Jose Estate	Mindoro	1918-1937	0.5	1.1	0.3	1.9	7.9	16.7	27.7	22.6	19.3	12.2	7.7	3.2	121.1
Iloilo City	Panay	1902-1937	2.5	1.8	1.3	1.6	6.2	10.4	17.6	15.2	12.4	10.6	8.3	4.7	92.6
Binalbagan Estate	Negros	1920-1937	2.3	1.6	1.8	2.1	8.3	8.0	15.5	12.2	12.7	11.2	7.8	3.9	87.4
Puerto Princesa	Palawan	1914-1937	2.4	1.5	1.6	2.1	6.6	7.8	8.7	7.1	8.4	10.3	10.8	10.0	77.3
							SECOND TYPE								
Daet	Luzon	1920-1937	13.9	11.5	9.1	5.3	7.0	6.8	9.4	6.9	14.0	22.8	26.7	23.3	157.0
Legaspi	Luzon	1902-1937	15.4	11.5	7.7	5.9	6.4	7.9	10.2	7.9	10.2	13.7	18.4	20.3	135.5
Gubat	Luzon	1903-1916	12.3	9.2	6.8	3.5	4.1	5.3	6.8	3.9	7.6	10.8	15.5	19.9	105.7
Borongon	Samar	1912-1937	25.3	17.3	12.9	10.3	9.6	9.3	7.4	5.7	7.2	13.0	21.2	25.3	164.5
Tacloban	Leyte	1903-1937	13.3	8.5	6.7	5.4	6.1	7.2	6.5	5.5	6.1	8.4	11.9	14.7	100.3
Surigao	Mindanao	1902-1937	21.4	14.9	13.9	10.0	6.2	4.9	7.0	5.1	6.6	10.7	16.8	24.4	141.9
Butuan	Mindanao	1903-1937	12.4	7.5	6.8	5.9	6.7	6.3	5.5	4.1	5.3	7.5	9.7	11.8	89.5
							THIRD TYPE								
Appari	Luzon	1902-1937	5.9	3.3	2.4	1.8	4.9	6.7	8.5	9.5	11.3	14.1	12.8	8.2	89.3
Lubuagan	Luzon	1931-1937	4.5	3.0	3.5	3.7	13.0	11.7	13.1	12.5	15.8	15.0	16.7	11.3	123.8
Echagüe	Luzon	1908-1937	2.3	1.5	2.1	3.1	6.8	4.5	8.1	8.1	9.0	9.1	9.6	6.3	70.5
Romblon	Romblon	1903-1937	4.6	3.6	2.2	2.6	5.5	8.7	11.8	8.5	9.6	12.6	11.9	8.8	90.4
Masbate	Masbate	1904-1937	7.2	4.8	3.0	1.4	4.0	6.3	7.2	6.7	6.9	6.6	8.5	9.4	72.0
Lucena	Panay	1918-1937	2.8	2.1	1.9	1.9	5.6	8.6	11.7	10,6	8.2	10.0	8.4	3.9	75.7
Cebu	Cebu	1902-1937	4.2	2.9	2.0	1.7	4.5	6.4	7.2	5.7	6.9	7.7	6.4	5.0	60.6
Dumaguete	Negros	1911-1937	4.5	3.1	2.0	1.8	4.3	5.3	5.6	4.3	5.5	7.7	5.8	5.1	55.0
Cagayan	Mindanao	1909-1937	3.7	2.3	1.4	1.3	4.9	8.6	8.9	7.9	8.5	7.8	4.8	4.2	64.3
Zamboanga	Mindanao	1903-1937	2.1	2.2	1.5	2.0	3.5	4.2	4.9	4.0	4.7	5.7	4.2	3.4	42.4
							FOURTH TYPE								
Baler	Luzon	1902-1937	8.1	6.9	8.2	11.3	10.8	8.9	11.2	6.9	11.9	15.4	15.1	14.4	129.1
Naga	Luzon	1902-1937	4.5	3.2	2.7	3.3	5.7	8.1	11.0	7.4	11.7	11.8	12.0	10.9	92.3
Halcon Rubber Experimental Station	Mindoro	1929-1937	8.4	4.1	3.9	5.1	7.5	7.2	10.2	12.0	7.4	14.0	13.2	13.3	106.3
Catbalogan	Samar	1915-1937	12.6	7.8	5.9	5.4	5.8	8.3	10.9	7.8	10.6	11.4	14.1	14.7	115.3
Bitaogan	Panay	1918-1937	6.1	3.3	2.6	2.1	8.0	9.0	9.9	9.0	9.9	12.2	10.0	8.7	90.8
Maasin	Leyte	1902-1937	9.9	6.2	5.3	2.9	4.8	6.6	10.3	8.0	10.2	9.5	11.7	12.4	97.8
Hacienda Bilbao	Negros	1919-1937	7.9	4.8	4.8	3.0	7.1	6.3	7.3	6.1	7.0	12.0	14.5	9.2	90.0
Tagbilaran	Bohol	1902-1937	5.0	3.5	3.6	4.9	4.5	5.7	8.0	5.3	6.6	8.7	8.1	6.2	70.1
Davao	Mindanao	1902-1937	4.8	4.4	5.2	5.8	9.3	9.1	6.5	6.5	6.7	7.9	5.3	6.1	77.6
Cotabato	Mindanao	1903-1933	3.6	3.4	3.5	6.1	8.5	9.6	11.0	8.8	8.6	11.2	7.4	4.2	85.9
Glan	Mindanao	1920-1937	3.3	3.1	3.3	3.3	5.0	4.2	8.3	6.9	5.6	4.0	6.6	4.7	58.3
Lapac Agricultural School	Lapac	1920-1937	3.3	3.6	3.9	3.7	5.7	7.4	4.9	3.6	4.7	6.2	6.4	3.8	57.2

Source: Commonwealth of the Philippines, Department of Agriculture and Commerce, Climate of the Philippines, 1939.

These variations in rainfall regime are an important factor in determining the types of crops grown in different regions, as will be indicated.

c. Typhoons. Typhoons of more or less violence occur at various times in the Philippines, largely from June through November. These chiefly affect the islands of Luzon and Samar, occasionally doing extensive damage to trees and crops.

4. Topography

The topography of the Philippines exhibits a wide range of conditions, which include level lowlands, rolling uplands, plateaus, and rugged mountains. Most of these types of conditions occur on each of the principal islands. (See Figure 5) Numerous rivers and some lakes are found on nearly all of the principal islands, although relatively few are used for navigation.

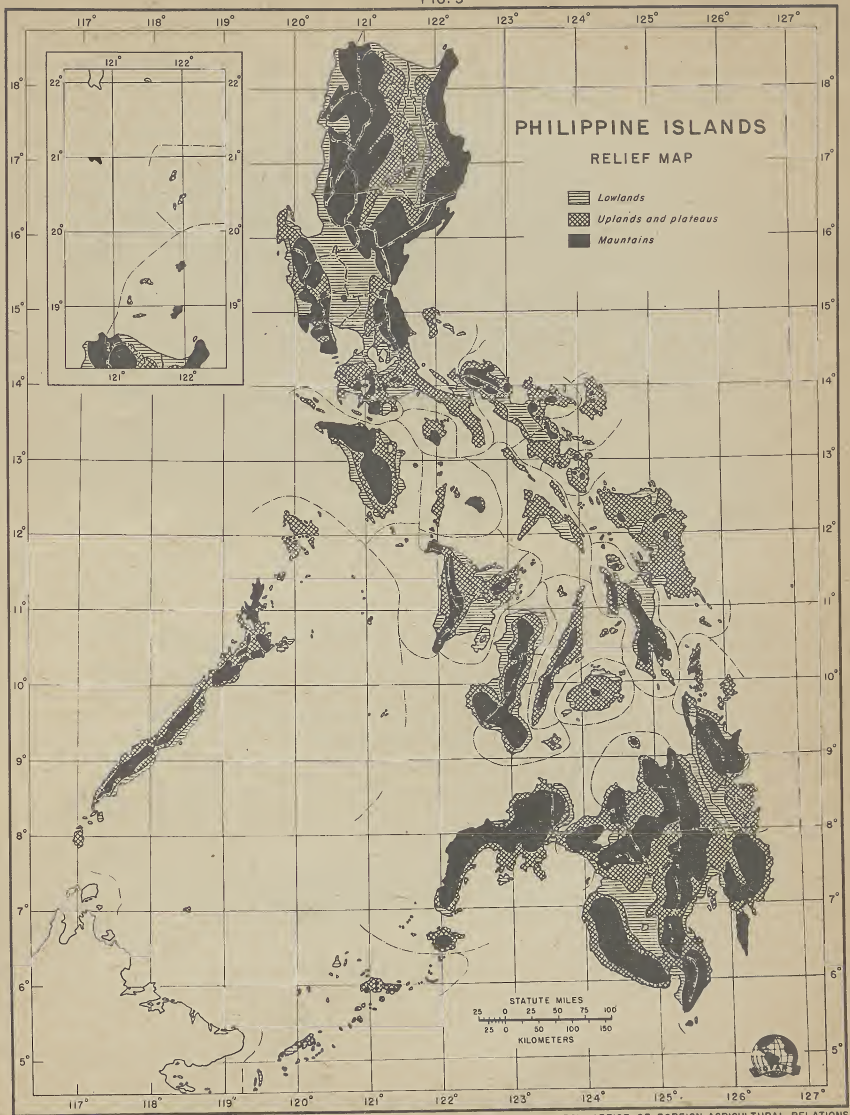
One of the most important topographic features of the large island of Luzon, from an agricultural point of view, is the central plain, that has an area of some 4,000 square miles. This extends from Manila northward to the Carballo Mountains. The Carballo Mountains themselves separate this valley from the fertile valley of the Cagayan in northeastern Luzon, which extends northward for 120 miles and includes approximately 10,000 square miles of land. The Cordillera central mountains, which border this valley on the west, contain many deep valleys and cultivated slopes, including the famous rice terraces of the Mountain Provinces. A narrow coastal plain along the western part of northern Luzon contains some very old cultivated areas. Southern Luzon is largely of volcanic origin, and is characterized by rolling hills, ridges and short valleys.

The island of Panay, bordering on the Visayan Sea, has a large central plain, a mountain range along the west coast, and a lesser one on the east coast. The important sugar producing island of Negros has a high central range. Most of the plantations lie on cultivated land along the coastal plains to the northeast, north, northwest and west. Masbate, Samar, and Bohol contain relatively low ridges, hills, plateaus and small valleys. Cebu, the most densely populated of the Visayan Islands, is marked by steep hills and ridges through its central part. Much of the hill land is cultivated, and small farms persist on the steep slopes; but the most intensively cultivated land is that of the coastal plain.

Palawan, somewhat removed to the west of this group of islands, has a mountainous ridge running practically the whole length. Only small coastal areas are available for cultivation, and at present, agriculture is developed little there.

RESTRICTED

FIG. 5



U.S. DEPARTMENT OF AGRICULTURE

NEG. 393 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

RESTRICTED

The topography of Mindanao is characterized by high rugged mountains and rolling uplands. One range of mountains, running north and south through the island, contains Mt. Apo, with an elevation of 9,450 feet, the highest peak in the Philippines. Other rugged mountains are found in western Zamboanga, southern Cotabato, and western Surigao Provinces. A considerable amount of generally rough topography with steep slopes is found between these mountains. The most important agricultural areas are the Cotabato valley, in southwest Mindanao, the valley of the Agusan River, Agusan Province, the region around Lake Lanao, Lanao Province, Occidental Misamis, and south central Davao. The Cotabato valley, containing an area of some 18,000 square miles, is the largest single agricultural region in the Philippines, but the soil resources as a whole are probably less rich than those of the plains of Luzon.

5. Land Resources and Utilization

The land of the Philippines has been divided into two general categories: land which the Bureau of Forestry considers should remain in permanent forests; and land which may be disposed of under the public land laws. The following figures summarize the estimates given for land of these categories (15):*

		Hectares
For Permanent Forest Land		11,035,340
Disposable Land		18,594,260
Forests of Commercial Value	5,832,856	
Forests not of Commercial Value	2,112,290	
Land in Farms	6,296,178 #	
Open Land, not in farms	4,209,990	
Unexplored	142,941	
TOTAL		29,629,600

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* Numbers in parenthesis refer to references, p. 147.

# According to the Census of 1939, 6,690,592 hectares.

The amount of land of these categories and the amount in farms is shown by provinces in table 6. The amount of land in farms, the item of principal interest to agriculture, constituted 22.6 percent of the total land area of the Philippines; but for individual provinces the percentage varied from as low as 4.3 percent, for Nueva Vizcaya, to as high as 82.6 percent, for Sorsogon. In general, the percentage is high for central and southern Luzon, and for many provinces of the Visayan area; whereas it is low for the more mountainous provinces of northern Luzon, and for Samar, Palawan, Sulu, and all provinces of Mindanao except the Misamis provinces.

Of the land belonging to the farm area, only a portion is cultivated. The remainder is classified as "idle," "pasture," "forest," or "other" land. For the entire Philippines, 59.1 percent of the farm area was cultivated. Idle land on farms constituted 16.6 percent of the farm area. Pasture land was 10.9 percent; forest land, 9.7 percent; and other land, 3.7 percent. (Table 7) Percentages, however, varied a great deal in the different provinces. Between 70 and 80 percent of the farm area was cultivated in the intensively cultivated parts of Luzon, as well as on Leyte and in the provinces of Surigao and Misamis Occidental on Mindanao; but less than 40 percent of the farm area was cultivated in the provinces of Batanes, Masbate, Mindoro, Palawan, Cotabato (Mindanao) and Bukidnon (Mindanao). The provinces of Masbate and Bukidnon had an unusually large percentage of pasture land; Palawan and Davao had a large percentage of forest land; and practically all of the provinces had idle land on farms, with a particularly large amount in Isabela, Mindoro, Agusan, Cotabato, and Zamboanga.

Presumably, an appreciable part of the land classified as idle land is suitable for cultivation, but it may not yet be certain what part of the total area of the Philippines could be cultivated. If it is true, as one estimate states, that approximately 14 million hectares, or 47.4 percent of the entire area of the Philippines, could be converted into productive farms, then the area now in farms might be about doubled. More complete soil surveys will probably be necessary, however, before this figure has been exactly determined. In any event, it seems quite clear that extensive tracts of land suitable for cultivation are still available in Nueva Vizcaya, Isabela, Mindoro, Palawan, several of the Visayan Islands, and on Mindanao, particularly in the provinces of Cotabato, Davao, Lanao, and Bukidnon.

6. Soils

Soils of the Philippines are very diverse. Developed soils show lateritic weathering, but few true laterites have been discovered. (27). There also are large areas of undeveloped soils, built up by

Table 6.- Land Resources

Province	Total Land 1/	For Permanent Forest Land 1/	Disposable		Percent of Total Land In Farms 1939 3/
			Total 1/	In Farms 1939 2/	
	Hectares	Hectares	Hectares	Hectares	
Luzon: Ilocos-Mountain Region	2,495,020	1,198,070	1,296,950	254,050	10.2
Abra	328,030	229,200	152,830	25,742	7.8
Ilocos Norte	334,890	119,860	215,030	52,172	15.6
Ilocos Sur	262,210	50,490	211,720	44,698	17.0
La Union	113,770	16,780	96,990	55,201	48.5
Mountain Province	1,402,120	781,740	620,380	76,237	5.4
Luzon: Cagayan Valley Region	2,624,510	1,196,650	1,427,860	372,798	14.2
Cagayan	854,850	319,620	535,230	157,667	18.4
Isabela	1,085,270	476,530	608,740	185,835	17.1
Nueva Vizcaya	684,390	400,500	283,890	29,296	4.3
Central Luzon-Zambales	2,547,270	803,720	1,743,550	926,371	36.4
Bataan	124,320	52,830	71,490	26,623	21.4
Bulacan	260,980	110,100	150,880	91,004	34.9
Manila City	3,700	--	3,700	126	3.4
Nueva Ecija	541,710	158,100	383,610	289,202	53.3
Pampanga	210,190	70,930	139,260	120,715	57.4
Pangasinan	504,170	93,490	410,680	202,130	40.1
Rizal	232,770	50,360	182,410	48,123	20.7
Tarlac	301,390	87,720	213,670	111,465	37.0
Zambales	368,040	180,190	187,850	36,983	10.0
Southern Luzon Rice-Coconut Region	1,846,260	517,430	1,328,830	629,074	34.1
Batangas	325,170	23,330	301,840	134,937	41.5
Cavite	120,180	14,200	105,980	67,378	56.1
Laguna	186,400	13,260	173,140	100,100	53.7
Tayabas	1,214,510	466,640	747,870	326,659	26.9
Southern Luzon Coconut-Abaca Region	1,325,850	300,240	1,025,610	618,664	46.7
Albay	402,400	92,900	309,500	179,997	44.7
Camarines Norte	200,790	68,440	132,350	62,101	30.9
Camarines Sur	536,610	106,770	429,840	226,191	42.2
Sorsogon	186,050	32,130	153,920	150,375	82.6
Panay	1,233,100	339,160	893,940	474,439	38.5
Antique	261,850	73,820	188,030	72,635	27.7
Capiz	442,890	165,060	277,830	151,761	34.3
Iloilo	528,360	100,280	428,080	250,043	47.4
Negros	1,301,990	422,890	879,100	419,911	32.3
Occidental	809,370	208,290	601,080	298,049	36.8
Oriental	492,620	214,600	278,020	121,862	24.7
Mindoro	1,017,350	448,730	568,620	164,508	16.2
Romblon	130,790	25,030	105,760	58,257	44.5
Cebu	483,550	55,250	428,300	199,055	41.2
Bohol	397,820	63,640	334,180	175,748	44.2
Samar	1,355,610	500,700	854,910	230,876	17.0
Palawan	1,455,320	656,330	798,990	90,551	6.2
Sulu	280,240	76,800	203,440	77,315	27.6
Batanes	19,170	8,030	11,140	5,379	28.1
Masbate	400,150	128,590	271,560	200,930	50.2
Marinduque	92,200	18,970	73,230	52,690	57.1
Leyte	778,300	154,120	624,180	278,248	35.8
Mindanao	9,845,100	4,120,990	5,724,110	1,461,728	14.8
Agusan	1,112,150	597,160	514,990	69,461	6.2
Bukidnon	821,870	262,710	559,160	126,970	15.4
Cotabato	2,491,580	1,196,700	1,294,880	238,085	9.6
Davao	1,929,720	607,040	1,322,680	329,207	17.1
Lanao	631,700	268,300	363,400	129,660	20.5
Occidental Misamis	176,580	78,680	97,900	71,798	40.7
Oriental Misamis	270,900	95,220	175,680	112,661	41.6
Surigao	757,400	277,330	480,070	109,849	14.5
Zamboanga	1,653,200	737,850	915,350	274,037	16.6
TOTAL	29,629,600	11,035,340	18,594,260	6,690,592	22.6

1/ Bulletin of Philippine Statistics, Vol. 6, No. 4, 1939.
2/ Census of the Philippines, 1939, Vol. II.
3/ Calculated.

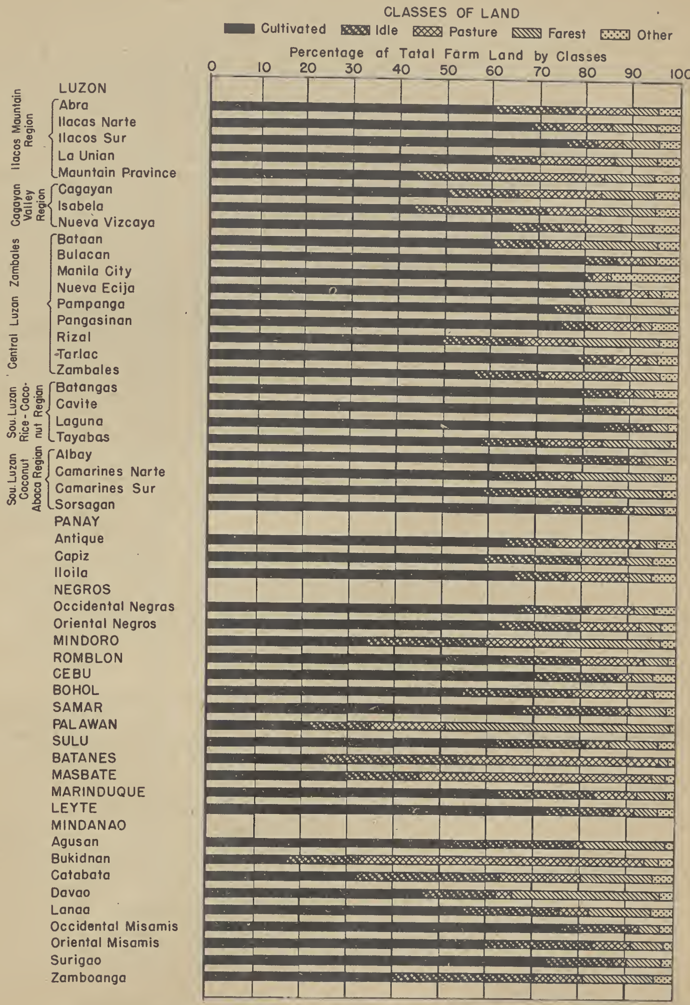
Table 7 .- LAND RESOURCES: Utilization of Farm area, by regions, 1939 1/

Region	Number of Farms	Total Farm Area	Cultivated		Idle	Pasture	Forest	Other
			Total	Amount Irrigated				
	Hectares	Hectares	Hectares	Hectares	Hectares	Hectares	Hectares	Hectares
Luzon: Ilocos-Mountain Region								
Abra	13,329	25,742	15,542	4,558	4,300	2,850	1,813	1,237
Ilocos Norte	31,234	52,172	35,647	18,598	3,535	5,227	4,999	2,764
Ilocos Sur	27,163	44,698	33,758	12,055	2,840	2,429	3,486	2,186
La Union	25,739	55,201	33,225	7,424	5,022	9,391	5,085	2,477
Mountain Province	36,127	76,237	33,451	13,999	11,838	18,943	8,204	3,800
Luzon: Cagayan Valley Region								
Cagayan	36,561	157,667	78,804	8,116	24,889	27,406	18,162	8,406
Isabela	32,719	185,835	80,044	7,959	52,068	21,188	22,141	10,395
Nueva Vizcaya	10,114	29,296	18,863	12,800	2,947	3,668	1,971	1,843
Central Luzon-Zambales								
Bataan	6,305	26,623	16,272	6,387	3,286	1,750	4,414	902
Bulacan	36,014	91,004	72,693	19,273	6,174	4,805	2,812	4,520
Manila City	56	126	102	13	2	4	1	17
Nueva Ecija	78,319	289,202	221,956	70,734	31,118	17,979	7,794	10,354
Pampanga	23,628	120,715	88,786	37,390	7,555	1,819	20,261	2,294
Pangasinan	86,615	202,130	151,916	58,522	15,317	18,574	5,149	11,174
Rizal	14,149	48,123	24,006	2,067	8,077	5,277	8,816	1,948
Tarlac	28,651	111,465	87,257	26,232	8,663	7,865	2,232	5,447
Zambales	12,165	36,983	20,730	5,474	5,673	6,074	3,032	1,475
Southern Luzon: Rice-Coconut Region								
Batangas	50,316	134,937	106,702	2,907	11,097	4,348	5,947	6,842
Cavite	22,463	67,378	52,914	14,464	6,293	2,956	2,178	3,037
Laguna	25,720	100,100	84,520	14,407	8,661	1,236	3,458	2,225
Tayabas	52,874	326,659	187,567	12,230	46,098	39,596	47,217	6,181
Southern Luzon: Coconut-Abaca Region								
Albay	44,261	179,997	134,102	15,858	26,791	4,879	8,953	5,273
Camarines Norte	10,011	62,101	38,351	973	7,957	2,062	11,952	1,779
Camarines Sur	35,822	226,191	132,595	15,671	45,923	17,405	22,898	7,371
Sorsogon	31,688	150,375	110,596	9,581	22,818	3,867	9,180	3,915
Panay								
Antique	23,662	72,635	45,902	8,401	8,010	13,028	2,685	3,011
Capiz	43,527	151,761	89,291	4,808	30,855	15,329	8,425	7,861
Iloilo	66,915	250,043	163,469	17,848	28,358	33,757	11,886	12,574
Negros								
Occidental	35,896	298,049	198,578	9,661	43,958	28,794	12,757	13,961
Oriental	47,440	121,862	75,926	2,866	19,975	16,535	5,709	3,716
Mindoro	16,271	164,508	56,114	6,034	41,340	27,589	34,087	5,378
Romblon	14,521	58,257	36,445	900	9,562	7,739	3,284	1,227
Cebu	121,548	199,055	139,161	1,880	35,218	6,544	9,052	9,079
Bohol	63,388	175,748	96,520	14,441	40,664	27,873	3,263	7,428
Samar	63,194	230,876	155,544	946	46,030	5,785	17,471	6,047
Palawan	11,304	90,551	19,671	1,686	12,008	13,951	43,276	1,646
Sulu	20,384	77,315	48,178	321	14,645	4,000	7,987	2,506
Batanes	1,724	5,379	1,340	--	1,334	2,340	195	169
Masbate	17,723	200,930	59,466	946	31,378	100,553	5,735	3,798
Marinduque	9,931	52,690	32,709	1,489	10,921	4,846	3,245	969
Leyte	100,794	278,248	202,006	13,435	40,315	12,289	13,863	9,775
Mindanao								
Agusan	12,072	69,461	36,976	402	17,553	1,286	12,140	1,508
Bukidnon	6,561	126,970	21,738	831	19,432	77,426	4,089	4,286
Cotabato	25,018	238,085	76,644	14,364	73,381	41,276	36,931	9,853
Davao	26,251	329,207	151,384	2,276	51,542	11,111	103,385	11,785
Lanao	24,529	129,660	71,452	4,340	26,740	8,146	17,050	6,271
Occidental Misamis	25,650	71,798	54,960	3,214	10,473	1,027	3,263	2,075
Oriental Misamis	22,521	112,661	67,233	1,405	25,791	8,975	7,793	2,870
Surigao	28,982	109,849	80,229	2,019	15,643	3,217	7,845	2,915
Zamboanga	32,877	274,037	112,475	3,950	84,092	27,212	39,848	10,410
TOTAL	1,634,726	6,690,592	3,953,810	516,155	1,108,160	732,227	647,419	248,985

1/ Source: Census of the Philippines, 1939, Vol. II.

FIG. 6

PHILIPPINE ISLANDS: UTILIZATION OF FARM LAND BY PROVINCES, 1939*



Names in capital letters indicate islands. Where island cantains two or more provinces, they are indicated below island name in upper and lower case letters.

**From the Census of the Philippines, 1939*

U.S. DEPARTMENT OF AGRICULTURE NEG. 396 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

recent flooding or deposits of volcanic ash. Parent material of upland soils often is composed of volcanic ash, but coral limestone is an important element, particularly in the southern islands. The soil material of plains, although usually of alluvial deposits derived from limestone, sandstone and shale, sometimes is partially composed of volcanic ash and rocks.

In general, the soils are not particularly fertile, although two general exceptions may be found. One exception, of which the soils of the Cagayan Valley may serve as an example, is the soils of alluvial flood plains which receive regular increments of silt. The second exception is found around active volcanoes, where upland soils from time to time receive moderate falls of volcanic ash rich in plant nutrients. (28) Soils of the plains which do not receive increments of silt are often strongly lacking in plant nutrient material, particularly nitrogen. Upland soils without the increment of volcanic ash also are often infertile, particularly where erosion has helped to remove the fertile surface layers.

A factor which in some cases greatly accelerates erosion is a method of cultivation referred to as Caingin. By this process, the forest trees or brush are cut early in the dry season and later burned. When rains fall, seed is planted in shallow holes, and the crop finally is harvested. Stumps are not removed and plowing is seldom done. After from one to several years the area is allowed to revert to native vegetation, and other areas are burned and planted. It frequently happens that the bare soil on steep slopes, exposed to heavy downpours, erodes severely. When cultivation is given up, brush and trees may again take possession, but when planted repeatedly after short intervals of time, tree growth may be crowded out by weeds and a heavy coarse grass known as Cogon grass (Yaka, Imperata spp.). It is difficult to break this sod with native plows, and almost impossible to do so with the native cultivator; so that the land reverts to a pasture use. It is suitable for pasture, on the other hand, only when kept closely cropped, or when the green shoots come up after burning.

This Caingin method of cultivation is severely condemned by some observers, on the grounds that it wastes forest resources, causes serious erosion of the land, requires a large amount of labor, and eventually results in the establishment of "grass deserts," or cogonals. Others feel that it provides the best means whereby mountain dwellers can produce foodstuffs for their subsistence, and that on no account is it to be condemned wholesale. In support of this opinion they point out that erosion actually is not usually severe when cultivation is limited to one season, that no work animals and practically no tools are required, that crop diseases and insect pests are largely controlled, and that crops of high quality may often thereby be produced (26).

Part II. PRE-WAR AGRICULTURAL PRODUCTION

1. Importance of Agriculture

The importance of agriculture to the economy of the Philippine Islands is indicated by the high proportion of gainful workers engaged in this pursuit, already mentioned (Table 3). It is indicated also by the value of agricultural exports. For the five-year period, 1935-1939, the value of the raw or manufactured products of sugarcane, coconuts, abaca and tobacco accounted for 90.6 percent of the value of all exports. Obviously the welfare of the Philippines is greatly dependent upon its agriculture and the outlet for its agricultural products.

2. The Available Agricultural Data

Precise statements concerning agricultural production and related points are impossible because of a lack of exactness in the basic data. Data are available from two general sources, the first of which is the Division of Statistics, Department of Agriculture and Commerce, which has made and published estimates covering crop and livestock production over a period of years. Data also are available from the census of 1939, which gathered detailed information covering one year, mainly the calendar year of 1938.

A considerable amount of difference is found when data from these two sources are compared. Exact comparisons between figures from these sources can not be made because, whereas census data represent the calendar year, estimates from the Division of Statistics cover the year beginning July 1. A general comparison is possible, however, by comparing the census data for the calendar year 1938 with the estimates for the two years 1937-38 and 1938-39. When such a comparison is made for a number of representative crops, on the other hand, it is found that the estimated figures are higher for some crops, while for others the higher figures are those of the census. Even within groups of crops there is no consistent relationship.

An important advantage, that would seem to be gained by using the estimates of the Division of Statistics, lies in the fact that they are available over a period of years, making it possible to calculate average figures. Also, in support of using these figures, one might question the accuracy of figures taken in a first census, because farmers, afraid that the information will be used as a basis of taxation, might tend to conceal certain items.

Nevertheless, the census figures have been used for the purpose of this study because it is considered that they are in general representative, and that they more nearly indicate the actual pre-war situation than other data. This conclusion has been reached, first, because the census has a basis in detailed investigation not possessed by the estimates. Furthermore, a study of the data on such things as rice production shows that the discrepancy between figures of census and estimates is often much greater in the case of individual provinces than for the whole Philippines; and, since this study is made on the basis of provinces and regions, it is believed that the census figures will more often represent the actual situation.

Besides the above considerations, an examination of the estimates for the principal crops over the decade 1931-1940 shows that production of the year 1938 appears to have been fairly representative of production of recent years (Tables 36 and 37, appendix). Therefore, while estimates of the Division of Statistics are sometimes used, the data of the census are relied upon in most cases.

3. General Characteristics of Philippine Agriculture

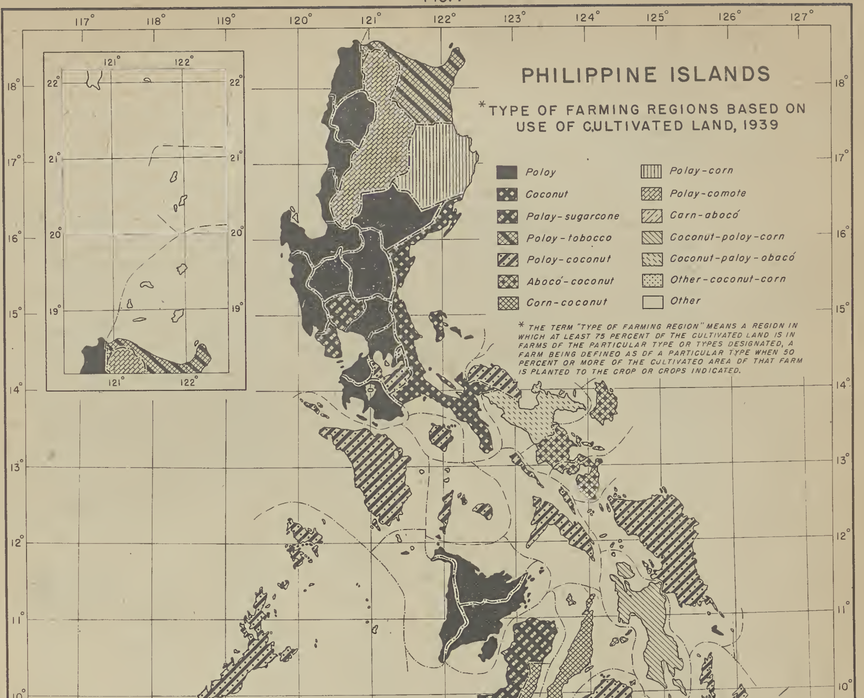
a. Crop Raising the Predominant Farm Enterprise. Although a large number of livestock and poultry were raised throughout the islands, the number of farms devoted principally to the raising of livestock was small. According to the census of 1939, of a total of 1,634,726 farms, only 1,741 were classified as livestock or poultry farms and there were very few dairy farms. At least 99 percent of all farms, therefore, were devoted principally to the raising of crops. Obviously, crop raising has been by far the most important enterprise of Philippine farmers.

b. Important Crops. The crops raised in the Philippines may be grouped into two principal categories: those which are grown mainly as subsistence crops; and those which are mainly commercial crops. The most important of the subsistence crops are palay (unmilled rice), corn (maize), and sweet potatoes (camotes). Others of lesser importance are bananas, cassava, gabe (taro), ubi (yam), mungo beans, dry beans, and peanuts. The most important of the commercial crops are coconuts, abaca (Manila hemp), sugarcane, and tobacco. Also of some importance are maguey (a coarse fiber), kapok, pineapples, derris root and cotton.

The number of acres planted to each of the important crops, in 1938, is shown in table 8. By far the largest acreage

RESTRICTED

FIG. 7



PHILIPPINE ISLANDS

*TYPE OF FARMING REGIONS BASED ON USE OF CULTIVATED LAND, 1939

* THE TERM "TYPE OF FARMING REGION" MEANS A REGION IN WHICH AT LEAST 75 PERCENT OF THE CULTIVATED LAND IS IN FARMS OF THE PARTICULAR TYPE OR TYPES DESIGNATED, A FARM BEING DEFINED AS OF A PARTICULAR TYPE WHEN 50 PERCENT OR MORE OF THE CULTIVATED AREA OF THAT FARM IS PLANTED TO THE CROP OR CROPS INDICATED.

ADAPTED FROM MAP IN THE CENSUS OF THE PHILIPPINES, 1939

U. S. DEPARTMENT OF AGRICULTURE

NEG. 392 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

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Table 8 .-PRINCIPAL CROPS: Reported Acreage, 1938 1/

Commodity	Area Planted		Percent of Total
	Hectares	Acres 2/	
Grain Crops			
Palay			
Lowland, 1st. crop	1,290,541	3,188,927	
Lowland, 2nd. crop	116,302	287,382	
Upland	423,144	1,045,589	
TOTAL	1,829,987	4,521,898	38.4
Corn			
1st. crop	436,073	1,077,537	
2nd. "	276,189	682,463	
3rd. "	86,854	214,616	
Green	17,608	43,509	
TOTAL	816,724	2,018,125	17.1
Main Commercial Crops			
Coconuts	1,051,215	2,597,552	
Abaca	291,531	720,373	
Sugarcane	229,698	567,584	
Tobacco	57,921	143,123	
Maguey	8,305	20,521	
Coffee	7,093 3/	17,527	
Cacao	4,558 3/	11,263	
Rubber	3,640 3/	8,994	
Cotton	1,562	3,860	
Derris	1,465	3,620	
Ramie	180	445	
TOTAL	1,657,168	4,094,862	34.7
Root Crops			
Sweet Potatoes	120,081	296,720	
Cassava	39,769	98,269	
Gabe	11,784	29,118	
Ubi	4,675	11,552	
Tugue	1,704	4,211	
Galiang	1,276	3,153	
Sinkamas	612	1,512	
Yautia	381	941	
Arrowroot	185	457	
Potatoes	106	262	
TOTAL	180,573	446,195	3.8

Commodity	Area Planted		Percent of Total
	Hectares	Acres 2/	
Legumes			
Mungo	27,930	69,015	
Peanuts	12,173	30,079	
Dry Beans	7,014	17,332	
Soybeans	570	1,408	
TOTAL	47,687	117,834	1.0
Vegetable Crops			
Eggplants	6,455	15,950	
Tomatoes	5,394	13,329	
Watermelons	2,655	6,561	
Onions	1,422	3,514	
Squash	700	1,730	
Cabbages	552	1,364	
Ampalaya	534	1,320	
Radishes	518	1,280	
Patola	247	610	
Ginger	164	405	
Upo	130	321	
Pechay	115	284	
Chile (Red pepper)	74	183	
Garlic	71	175	
Mustard	64	158	
Kondol	51	126	
Pepper (Pimiento)	38	94	
Cucumber	34	84	
Pumpkins	13	32	
Others	33,744 5/	83,381	
TOTAL	52,975 3/	130,901	1.1
Fruit and Nuts			
Pineapples	10,575	26,131	
Bananas	92,254 4/	227,960	
Others	75,536	186,649	
TOTAL	178,365 6/	440,740	3.7
Other Crops	8,159 5/	20,161	.2
Grand Total	4,771,638	11,790,719	100.0

Footnotes on separate page.

Table 8 .-(Continued -2-)

1/ Source: Except where otherwise noted, from Commonwealth of the Philippines, Commission of the Census, Census of the Philippines, 1939, vol. II, Manila, 1941.

2/ Hectares x 2.471 = acres.

3/ Commonwealth of the Philippines, Bureau of the Census and Statistics. Yearbook of Philippine Statistics, 1940, 1941.

4/ Commonwealth of the Philippines, Division of Statistics, Department of Agriculture and Commerce, Bulletin of Philippine Statistics, vol. 6, 1939

5/ Obtained by subtracting the itemized acreage from total reported.

6/ Figure from Yearbook of Philippine Statistics, 1940, less acreage in peanuts.

was that of palay, in which was a substantial acreage of upland rice. Coconuts had the next largest number of acres, and corn was third. There followed, in the given order, abaca, sugarcane, sweet potatoes, tobacco and cassava. Of the total number of acres reported for all crops, rice and corn accounted for 55.5 percent. The main commercial crops made up 34.7 percent, root crops 3.8 percent, and all other crops 6.0 percent. These figures refer to the actual number of acres of crops, not to the amount of land occupied by the crop.

For some purposes, a better indication of the relative importance of a crop is given by stating the amount of land devoted to that crop in terms of a percentage of the total amount of cultivated land. Such percentage figures would not be the same as the above figures because of the practice of double cropping. Warm temperatures throughout the year and a regular supply of rainfall make it about as easy to raise certain crops in February as in August. Therefore, rice may follow rice on the same piece of land. Corn also may follow corn, and mungo beans may be planted on a field from which rice has just been harvested. In the hills, beans or cowpeas may be planted in a field of corn for a later harvest, and root crops or beans may be planted in young or sparsely planted coconut plantations. The total amount of land cultivated in 1938 was reported to be 3,953,810 hectares (9,769,864 acres). The same year 4,771,638 hectares (11,790,717 acres) of crops were reportedly raised. The latter figure is approximately 20 percent larger than the former, and one may assume that this percentage represents roughly the amount of land upon which more than one crop a year were harvested.

Since more than one kind of crop may occupy a single piece of land in a given year, no precise figure to indicate the exact proportion of all cultivated land devoted to a given crop is possible. By proceeding upon certain fairly tenable assumptions, however, a rough idea of this figure for certain of the crops, as the principal crop on the land that year, can be obtained. This figure has been arrived at, in the case of lowland rice, by assuming that all of the second crop was planted on the same land which produced the first crop. In the case of upland rice, it was assumed that one crop was raised per year and that land producing this crop raised no other major crop, so that full value was given to the reported acreage. In the case of corn, of which more than one crop is raised per year, it was assumed that all the corn was raised on the land on which the largest crop was grown. These assumptions quite often, although not always, represent the actual situation. Some corn very likely was raised on land other than that occupied by the largest crop, so the percentage shown for corn is probably somewhat low.

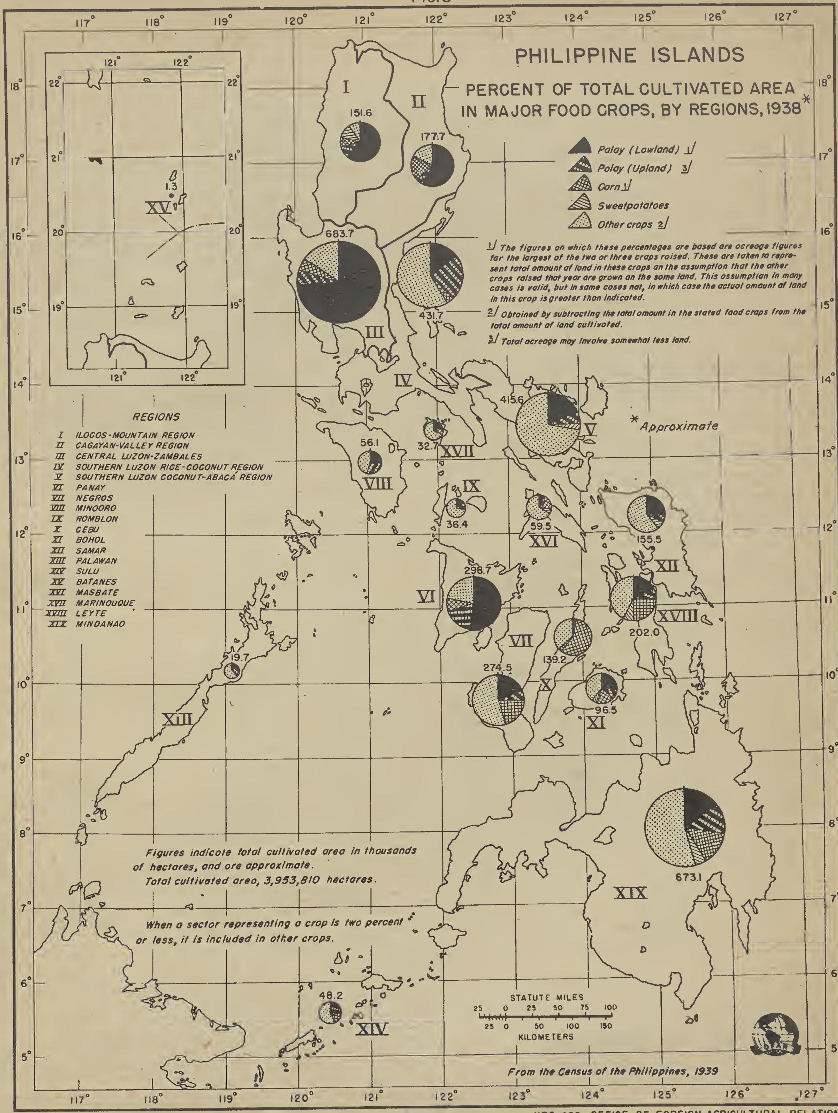
It might be pointed out, also, that the reported acreage for other crops, like coconuts, may be too high, and the percentage figures arrived at would be correspondingly out of line. The figures as calculated are offered, therefore, as approximations, which appear to be about as good as can be obtained under the circumstances. They are shown by regions in tables 9 and 10, and graphically in figures 7 and 8. For the most important crops, for the Philippines as a whole, they are as follows:

Corn	Percent of Total Cultivated Area Estimated Devoted to the Crop
Lowland Palay	32.6
Upland Palay	10.7
Coconuts	26.6
Corn	11.1
Abaca	7.4
Sugarcane	5.8
Sweet Potatoes	3.0
Tobacco	1.5

c. Agricultural Regions. One of the notable characteristics of the agriculture of the Philippines is its regional character, which is the natural result of variations in climatic and soil conditions. Although rice is grown to some extent in every province, the heavier soils, level topography, and wet and dry seasons of central Luzon make lowland rice peculiarly suited there. Coconuts, on the other hand, require a climate having no prolonged dry season, as found in southern Luzon. And abaca is particularly at home under conditions of an even distribution of rainfall, high humidity and type of soil, such as prevail in Davao. Distinct agricultural regions with common characteristics, therefore, can be defined. (See Figure 9)

Luzon, because of its large size and the diversity of its climate and soils, may be divided into five such regions. Central Luzon is a large rice producing area, where sugarcane is also an important crop. In the northeast, in the Cagayan Valley, is another rich area where rice occupies a large part of the cultivated land, but where tobacco and corn are also important. In the Ilocos-Mountain Region of Northwest Luzon, rice, corn and sweet potatoes are the most important crops. Southern Luzon contains one region, designated in this study as the Southern Luzon Rice-Coconut Region, where coconuts are of large commercial importance, and a second, called the Southern Luzon Coconut-Abaca Region, which produces some rice but where coconuts and abaca are the most outstanding crops.

FIG. 8



PHILIPPINE ISLANDS

PERCENT OF TOTAL CULTIVATED AREA IN MAJOR FOOD CROPS, BY REGIONS, 1938*

1/ The figures on which these percentages are based are acreage figures for the largest of the two or three crops raised. These are taken to represent total amount of land in these crops on the assumption that the other crops raised that year are grown on the same land. This assumption in many cases is valid, but in some cases not, in which case the actual amount of land in this crop is greater than indicated.

2/ Obtained by subtracting the total amount in the stated food crops from the total amount of land cultivated.

3/ Total acreage may involve somewhat less land.

* Approximate

Figures indicate total cultivated area in thousands of hectares, and are approximate.
Total cultivated area, 3,953,810 hectares.

When a sector representing a crop is two percent or less, it is included in other crops.

From the Census of the Philippines, 1939

U.S. DEPARTMENT OF AGRICULTURE

NEG. 402 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

Table 9.- SUBSISTENCE CROPS: Percent of the total cultivated area estimated to be occupied by each of the major crops, 1938, by regions and provinces. 1/

	Total Cultivated Area		Palay (Lowland) 2/		Palay (Upland) 3/		Corn 2/		Sweet Potatoes		All Other Crops 4/	
	(Hectares)	(Per-cent)	(Hectares)	(Per-cent)	(Hectares)	(Per-cent)	(Hectares)	(Per-cent)	(Hectares)	(Per-cent)	(Hectares)	(Per-cent)
Luzon: Ilocos-Mountain Region	151,623	100.0	93,378	61.6	14,235	9.4	12,334	8.1	17,465	11.5	14,211	9.4
Abra	15,542		10,921		1,158		3,058		170		235	
Ilocos Norte	35,647		24,950		1,649		3,308		441		5,299	
Ilocos Sur	33,758		22,703		2,419		3,760		786		4,090	
La Union	33,225		21,740		5,277		1,414		658		4,136	
Mountain Province	33,451		13,064		3,732		794		15,410		451	
Luzon: Cagayan Valley Region	177,711	100.0	101,700	57.2	9,152	5.1	34,793	19.6	2,306	1.3	29,760	16.8
Cagayan	78,804		47,094		2,052		17,013		294		12,351	
Isabela	80,044		40,900		6,187		16,737		378		15,842	
Nueva Vizcaya	18,863		13,706		913		1,043		1,634		1,567	
Central Luzon-Zambales	683,718	100.0	508,159	74.3	40,209	5.9	29,959	4.4	4,512	.7	100,879	14.7
Bataan	16,272		8,170		1,592		267		307		5,936	
Bulacan	72,693		60,980		2,485		1,782		249		7,197	
Manila City	102		48		-		7		1		46	
Nueva Ecija	221,956		195,263		5,253		11,786		1,104		8,550	
Pampanga	88,786		49,505		4,428		1,558		398		32,897	
Pangasinan	151,916		107,351		13,105		12,595		1,376		17,489	
Rizal	24,006		16,958		2,114		445		203		4,286	
Tarlac	87,257		53,800		9,996		1,313		681		21,467	
Zambales	20,730		16,084		1,236		206		193		3,011	
Southern Luzon Rice-Coconut Region	431,703	100.0	63,598	14.7	99,910	23.1	14,969	3.5	1,831	.4	251,395	58.3
Batangas	106,702		6,404		60,575		10,532		185		29,006	
Cavite	52,914		16,385		21,890		1,793		302		12,544	
Laguna	84,520		19,096		5,034		1,260		172		58,958	
Tayabas	187,567		21,713		12,411		1,384		1,172		150,887	
Southern Luzon Coconut-Abaca Region	415,644	100.0	76,107	18.3	23,973	5.8	4,486	1.1	12,050	2.9	299,028	71.9
Albay	134,102		21,357		4,654		2,187		5,855		100.049	
Camarines Norte	38,351		7,875		566		150		666		29,094	
Camarines Sur	132,595		33,580		14,555		1,352		2,974		80,134	
Sorsogon	110,596		13,295		4,198		797		2,555		89,751	
Panay	298,662	100.0	158,706	53.1	51,216	17.1	24,094	8.1	5,723	1.9	58,923	19.8
Antique	45,902		24,888		10,536		4,201		667		5,610	
Capiz	89,291		41,583		14,513		2,944		2,246		28,005	
Iloilo	163,469		92,235		26,167		16,949		2,810		25,308	
Negros	274,504	100.0	52,642	19.2	17,115	6.2	54,182	19.7	2,855	1.0	147,710	53.9
Occidental	198,578		47,560		15,137		22,097		1,425		86,219	
Oriental	75,926		5,082		1,978		32,085		1,430		40,575	
Mindoro	56,114	100.0	14,265	25.4	16,596	29.6	1,182	2.1	503	.9	23,568	42.0
Romblon	36,445	100.0	5,366	14.7	4,934	13.5	1,045	2.9	749	2.0	24,351	66.9
Cebu	139,161	100.0	3,699	2.7	839	.6	81,197	58.3	3,388	2.4	50,038	36.0
Bohol	96,520	100.0	25,550	26.5	9,460	9.8	18,058	18.7	6,417	6.6	37,035	38.4
Samar	155,544	100.0	39,462	25.4	10,677	6.7	3,200	2.1	10,763	6.9	91,442	58.9
Palawan	19,671	100.0	1,701	8.6	5,607	28.5	580	3.0	914	4.6	10,869	55.3
Sulu	48,178	100.0	513	1.1	14,524	30.1	5,700	11.8	663	1.4	26,778	55.6
Batanes	1,340	100.0	1	.1	152	11.3	105	7.8	310	23.1	772	57.7
Masbate	59,466	100.0	4,040	6.8	3,709	6.2	8,357	14.1	3,825	6.4	39,535	66.5
Marinduque	32,709	100.0	5,458	16.7	4,469	13.7	379	1.1	486	1.5	21,917	67.0
Leyte	202,006	100.0	35,733	17.7	14,520	7.2	50,367	24.9	15,406	7.6	85,980	42.6
Mindanao	673,091	100.0	100,466	14.9	81,848	12.2	94,818	14.1	29,914	4.4	366,045	54.4
Agusan	36,976		1,745		4,779		5,718		4,109		20,625	
Bukidnon	21,738		873		2,784		7,258		922		9,901	
Cotabato	76,644		29,103		10,543		10,054		1,985		24,959	
Davao	151,384		3,908		10,454		8,432		8,343		120,247	
Lanao	71,452		18,085		25,662		13,178		1,792		12,735	
Occidental Misamis	54,960		4,486		6,271		17,174		943		26,086	
Oriental Misamis	67,233		2,413		2,848		13,953		2,876		45,143	
Surigao	80,229		26,604		3,169		3,627		5,580		41,249	
Zamboanga	112,475		13,249		15,338		15,424		3,364		65,100	
Total	3,953,810	100.0	1,290,544	32.6	423,145	10.7	439,805	11.1	120,080	3,0	1,788,236	42.6

1/ Based on Data in Census of the Philippines, 1939, vol. II.

2/ The total amount of land actually occupied by Rice and Corn cannot be exactly determined because the two or three crops harvested per year are often planted on the same piece of ground. The figures given here represent the area of the largest crop, taken on the assumption that the other crops were raised on the same land. This assumption is approximately valid in a number of cases, particularly for lowland rice. In other cases it may not be valid, when the actual amount of land would be greater than shown here.

3/ It is probable that a part of this crop in some provinces was planted on land which also produced one crop of lowland rice.

4/ Obtained by subtracting the total amount in the 4 stated crops from the total amount cultivated.

Table 10.-COMMERCIAL CROPS: Percent of the total cultivated area estimated to be occupied by each of the important commercial crops, 1938, by regions ,and provinces. 1/

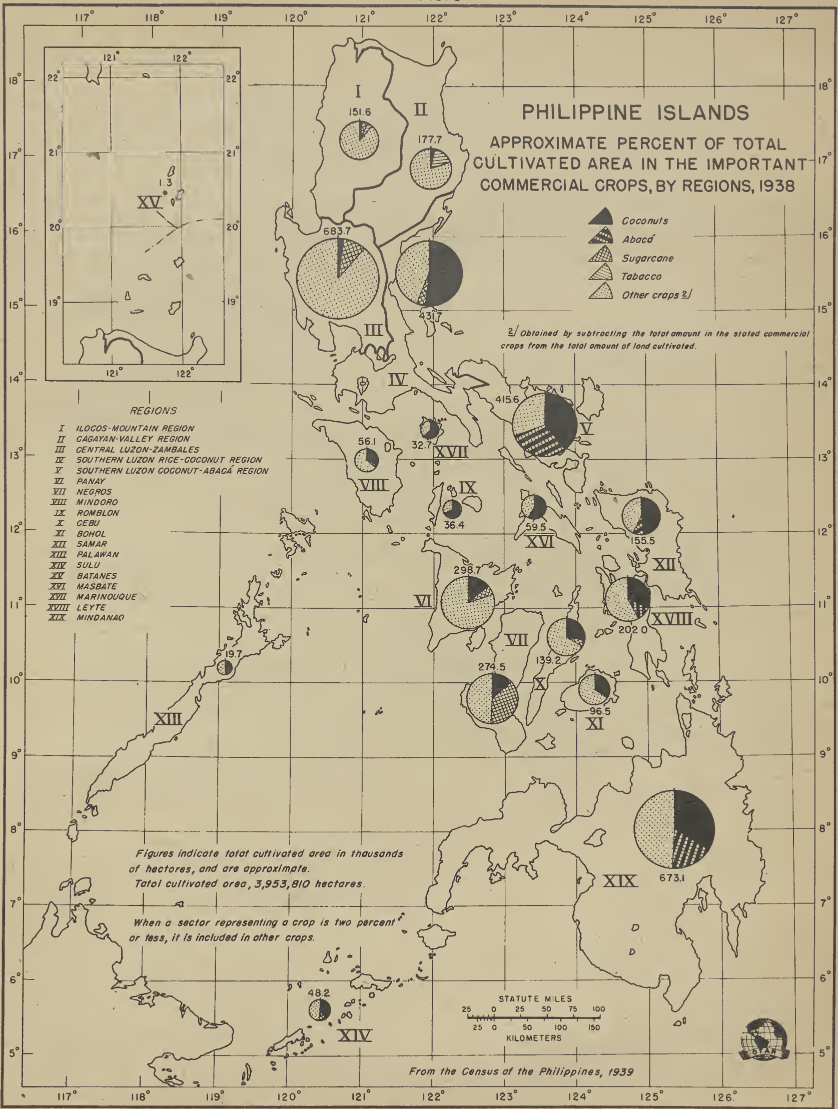
	Total Cultivated Area		Abaca		Coconuts		Sugarcane		Tobacco		All Other Crops 2/	
	(Hectares)	(Per-cent)	(Hectares)	(Per-cent)	(Hectares)	(Per-cent)	(Esctares)	(Per-cent)	(Hectares)	(Per-cent)	(Hectares)	(Per-cent)
Luzon: Ilocos Mountain Region	151,623	100.0	1	3/	3,479	2.3	6,582	4.3	6,396	4.2	135,165	89.2
Abra	15,542		.2		81		394		599		14,468	
Ilocos Norte	35,647		-		684		2,101		1,456		31,406	
Ilocos Sur	33,758		-		716		2,590		749		29,703	
La Union	33,225		1		1,606		1,161		3,367		27,090	
Mountain Province	33,451		-		392		336		225		32,498	
Luzon: Cagayan Valley Region	177,711	100.0	7	3/	4,268	2.4	2,040	1.1	28,950	16.3	142,446	80.2
Cagayan	78,804		5		2,849		761		10,342		64,847	
Isabela	80,044		1		1,113		909		18,152		59,869	
Nueva Vizcaya	18,863		1		306		370		456		17,730	
Central Luzon-Zambales	683,718	100.0	3	3/	13,960	2.0	59,443	8.7	5,609	.8	604,703	88.5
Bataan	16,272		1		108		3,360		4		12,799	
Bulacan	72,693		-		111		1,525		215		70,842	
Manila City	102		-		-		-		.1		102	
Nueva Ecija	221,956		-		175		2,210		1,599		217,972	
Pampanga	88,786		-		11		28,256		41		60,478	
Pangasinan	151,916		-		10,977		5,059		3,416		132,464	
Rizal	24,006		2		382		305		41		23,276	
Tarlac	87,257		-		775		18,295		257		67,930	
Zambales	20,730		-		1,421		433		36		18,840	
Southern Luzon Rice-Coconut Region	431,703	100.0	198	3/	223,425	51.8	19,351	4.5	860	.2	187,869	43.5
Batangas	106,702		11		17,210		10,227		348		78,906	
Cavite	52,914		36		7,109		1,424		316		44,029	
Laguna	84,520		18		49,864		6,873		32		27,733	
Tayabas	187,567		133		149,242		827		164		37,201	
Southern Luzon Coconut-Abaca Region	415,644	100.0	125,993	30.3	161,230	38.8	4,143	1.0	143	3/	124,135	29.9
Albay	134,102		49,730		50,565		1,020		48		36,739	
Camarines Norte	38,351		4,833		22,939		217		6		10,356	
Camarines Sur	132,595		26,500		44,235		1,951		82		59,827	
Sorsogon	110,596		44,930		43,491		955		7		21,213	
Panay	298,662	100.0	2,769	.9	41,661	13.9	16,143	5.4	2,268	.8	235,821	79.0
Antique	45,902		368		6,203		1,282		272		37,777	
Capiz	89,291		2,037		19,064		5,167		123		62,900	
Iloilo	163,469		364		16,394		9,694		1,873		135,144	
Negros	274,504	100.0	2,105	.8	36,916	13.4	103,426	37.7	2,745	1.0	129,312	47.1
Occidental	198,578		210		12,244		97,281		912		87,931	
Oriental	75,926		1,895		24,672		6,145		1,833		41,381	
Mindoro	56,114	100.0	1,499	2.7	18,000	32.1	1,939	3.4	63	.1	34,613	61.7
Romblon	36,445	100.0	149	.4	24,689	67.8	45	.1	153	.4	11,409	31.3
Cebu	139,161	100.0	746	.5	39,127	28.1	7,052	5.1	3,544	2.6	88,692	63.7
Bohol	96,520	100.0	562	.6	32,954	34.1	684	.7	360	.4	61,960	64.2
Samar	155,544	100.0	14,082	9.1	75,927	48.8	423	.3	654	.4	64,458	41.4
Palawan	19,671	100.0	3	3/	9,687	49.2	112	.6	59	.3	9,810	49.9
Sulu	48,178	100.0	5,273	10.9	19,460	40.4	715	1.5	246	.5	22,484	46.7
Batanes	1,340	100.0	1	.1	151	11.3	73	5.4	11	.8	1,104	82.4
Masbate	59,466	100.0	621	1.0	35,095	59.0	404	.7	1,395	2.4	21,951	36.9
Marinduque	32,709	100.0	1,120	3.4	20,477	62.6	410	1.3	81	.2	10,621	32.5
Leyte	202,006	100.0	21,134	10.5	63,651	31.5	2,473	1.2	1,564	.8	113,184	56.0
Mindanao	673,091	100.0	115,265	17.1	227,060	33.8	4,241	.6	2,823	.4	323,702	48.1
Agusan	36,976		6,856		11,258		452		282		18,128	
Bukidnon	21,738		4,745		312		177		66		16,438	
Cotabato	76,644		4,485		16,318		996		430		54,415	
Davao	151,384		81,820		37,500		602		511		30,951	
Lanao	71,452		938		10,634		290		354		59,236	
Occidental Misamis	54,960		376		27,443		110		183		26,848	
Oriental Misamis	67,233		4,187		38,068		99		247		24,632	
Surigao	80,229		9,391		34,285		260		158		36,135	
Zamboanga	112,475		2,467		51,242		1,255		592		56,919	
Total	3,953,810	100.0	291,531	7.4	1,051,217	26.6	229,699	5.8	57,924	1.5	2,323,439	58.7

1/ Based on Data in Census of the Philippines, 1939, vol. II.

2/ Obtained by subtracting the total amount in the four stated crops from the total amount cultivated.

3/ Less than .05 percent.

FIG. 9



PHILIPPINE ISLANDS

APPROXIMATE PERCENT OF TOTAL CULTIVATED AREA IN THE IMPORTANT COMMERCIAL CROPS, BY REGIONS, 1938

2/ Obtained by subtracting the total amount in the stated commercial crops from the total amount of land cultivated.

Figures indicate total cultivated area in thousands of hectares, and are approximate.
Total cultivated area, 3,953,810 hectares.

When a sector representing a crop is two percent or less, it is included in other crops.

From the Census of the Philippines, 1939

U.S. DEPARTMENT OF AGRICULTURE

NEG. 403 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

The Island of Panay is mainly a rice producing region; but on Negros to the southeast, particularly in Occidental Negros, sugarcane is the most important crop. On the Island of Cebu, corn is the principal crop. The remaining islands around the Visayan Sea, and Palawan, produce mainly rice and coconuts, with some abaca and corn.

Mindanao, although treated in this study as one region, is not entirely uniform in its cropping characteristics. The part most unlike the rest is Davao Province, which has more than half of its cultivated land in abaca and a large acreage in coconuts. The other provinces grow mainly rice, corn, and coconuts, with some abaca and other commercial crops.

The locations of these regions, as so defined, are shown in figure 2.

d. Size of Farm. The average size of farm varies in different parts of the Philippines, depending upon how the land is used, what crops are grown, and the type of land tenure. Farms are larger where more land is in pasture and where commercial crops, such as coconuts, sugarcane, or abaca, are the major crops. Where the main crops are rice or other subsistence crops, raised largely by owners or tenants, the average size of farm is lower. The lowest average size for any province is 4.1 acres, found in the crowded subsistence farms of Cebu, Ilocos Norte and Ilocos Sur. The largest average size is 47.8 acres, found in Bukidnon Province where cattle ranches are common. Farms generally are large in the provinces of Isabela, the Camarines, Occidental Negros, Mindoro, Palawan, Masbate, and most of the provinces of Mindanao; farms generally are small in most of central and north Luzon, on Panay and on a number of other islands of the Visayan area. For the Philippines the average size of farm is 10.1 acres. The average amount of land cultivated per farm is 6.0 acres (Table 11).

Table 11.- Average Size of Farm, 1939

	Average Amount of Cultivated Land Per Farm		Average Size of Farm Area Per Farm	
	Hectares	Acres 1/	Hectares	Acres 1/
Luzon: Ilocos-Mountain Region				
Abra	1.17	2.9	1.93	4.8
Ilocos Norte	1.14	2.8	1.67	4.1
Ilocos Sur	1.24	3.1	1.65	4.1
La Union	1.29	3.2	2.14	5.3
Mountain Province	0.93	2.3	2.11	5.2
Luzon: Cagayan Valley Region				
Cagayan	2.16	5.3	4.31	10.7
Isabela	2.45	6.1	5.68	14.0
Nueva Vizcaya	1.87	4.6	2.90	7.2
Central Luzon-Zambales				
Bataan	2.58	6.4	4.22	10.4
Bulacan	2.02	5.0	2.53	6.9
Manila City	1.83	4.5	2.25	5.6
Nueva Ecija	2.83	7.0	3.69	9.1
Pampanga	3.76	9.3	5.11	12.6
Pangasinan	1.75	4.3	2.33	5.8
Rizal	1.70	4.2	3.40	8.4
Tarlac	3.05	7.5	3.89	9.6
Zambales	1.70	4.2	3.04	7.5
Southern-Luzon Rice-Coconut Region				
Batangas	2.12	5.2	2.68	6.6
Cavite	2.36	5.8	3.00	7.4
Laguna	3.29	8.1	3.89	9.6
Tayabas	3.55	8.8	6.18	15.3
Southern-Luzon Coconut-Abaca Region				
Albay	3.03	7.5	4.07	10.1
Camarines Norte	3.83	9.5	6.20	15.3
Camarines Sur	3.70	9.1	6.31	15.6
Sorsogon	3.49	8.6	4.75	11.7
Panay				
Antique	1.94	4.8	3.07	7.6
Capiz	2.05	5.1	3.49	8.6
Iloilo	2.44	6.0	3.74	9.2
Negros				
Occidental	5.53	13.7	8.30	20.5
Oriental	1.60	4.0	2.57	6.4
Mindoro	3.45	8.5	10.11	25.0
Romblon	2.51	6.2	4.01	9.9
Cebu	1.14	2.8	1.64	4.1

Table 11 -- (Continued -2-)

Province	Average Amount of Cultivated Land Per Farm		Average Size of Farm Area Per Farm	
	Hectares	Acres 1/	Hectares	Acres 1/
Bohol	1.52	3.8	2.77	6.8
Samar	2.46	6.1	3.65	9.0
Palawan	1.74	4.3	8.01	19.8
Sulu Arch.	2.36	5.8	3.79	9.4
Batanes	.78	1.9	3.12	7.7
Masbate	3.36	8.3	11.34	28.0
Marinduque	3.29	8.1	5.31	13.1
Leyte	2.00	4.9	2.76	6.8
Mindanao				
Agusan	3.06	7.6	5.75	14.2
Bukidnon	3.31	8.2	19.35	47.8
Cotabato	3.06	7.6	9.52	23.5
Davao	5.77	14.3	12.54	31.0
Lanao	2.91	7.2	5.29	13.1
Occidental Misamis	2.14	5.3	2.80	6.9
Oriental Misamis	2.99	7.4	5.00	12.4
Surigao	2.77	6.8	3.79	9.4
Zamboanga	3.42	8.5	8.34	20.6
The Philippines	2.42	6.0	4.09	10.1

Source: Census of the Philippines, 1939, vol. II.

1/ Hectares x 2.471 = Acres

The significance of the size of farm with respect to farmer welfare is seen more readily in the proportion of all farms that is found within each of the various size groups (Table 12). More than half of all the farms in the Philippines contain less than two hectares (4.94 acres) of land per farm, and about 23 percent have less than one hectare (2.47 acres). Only 4.3 percent of the farms contain 10 or more hectares (24.7 acres or more) of land per farm. On the other hand, the 23 percent of farmers having less than one hectare per farm cultivated only 4.9 percent of the total cultivated land while, at the other end of the scale, the 4.3 percent of the farmers having 10 or more hectares per farm cultivated 24.1 percent of the total cultivated land.

Table 12.- SIZE OF FARM: Percent distribution of the cultivated land and percent distribution of farms according to the size of farm, 1939. 1/

Size of Farm	Percent of Total Cultivated Land	Number of Farms	Percent of All Farms
Under 0.99 hectares	4.9	368,903	22.5
1 - 1.99 "	15.6	489,053	29.9
2 - 2.99 "	16.4	306,496	18.7
3 - 3.99 "	12.2	164,458	10.1
4 - 4.99 "	8.7	94,106	5.8
5 - 9.99 "	18.3	142,587	8.7
10 - 19.99 "	9.7	48,367	3.0
Over 20 "	14.4	20,756	1.3
Total	100.0	1,634,726	100.0

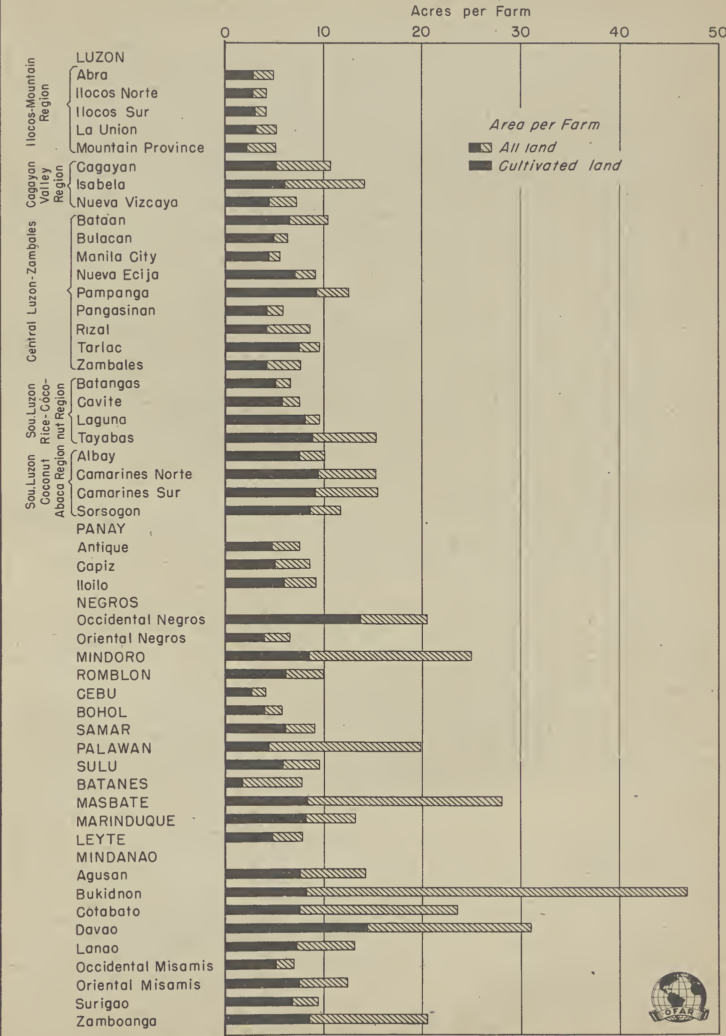
1/ Census of the Philippines, 1939, Vol. II, pp. 927 and 928.

NOTE: 1 hectare = 2.471 acres.

The amount of land cultivated by a large part of the farmers of the Philippines, therefore, is not large, although possibly somewhat larger than the amount available to farmers of China, Japan or Formosa. When there is also taken into account the existing low level of yields, and the high proportion of the land that carries only one crop per year, it may be concluded that a basis does not exist at the present time for a high standard of living among a large portion of the agricultural population.

FIG. 10

PHILIPPINE ISLANDS: TOTAL AREA AND CULTIVATED AREA PER FARM, 1939*



Names in capital letters indicate islands. Where island contains two or more provinces, they are indicated below island name in upper and lower case letters.

**From the Census of the Philippines, 1939*

U.S. DEPARTMENT OF AGRICULTURE NEG. 397 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

e. Farm implements and Tools. A certain amount of mechanical equipment is used in farm operations, although its use is confined chiefly to rice or sugarcane haciendas. The two main items of import during the period 1935-1939, were tractors and rice threshers, of which an average of 111 tractors and 27 rice threshers were imported annually. A few of the threshers were simple, inexpensive Japanese makes, but the larger number were of modern types imported from the United States. Not all of the tractors imported were used for agricultural purposes, some being used for moving earth in road building and similar enterprises. No data with respect to the numbers in use for agricultural purposes exist. A very high proportion of the farm draft power was supplied by work animals, which are discussed in a subsequent section under Animal Husbandry.

Of the ordinary tillage implements, a number of single-handled steel plows, a few cultivators, and some disc harrows recently have come into use. The principal implements still used, however, are the native plows and harrows. The plows in common use are of two general types; one adapted to upland plowing and one adapted to lowland plowing. Both are single-handled plows with wooden beams. Moldboards are of different turn, depending upon the nature of the soil and the sod covering, and commonly are made of cast scrap iron, imported pig iron, or white fine-grained iron. The shares are practically uniform in size and shape, and perform the function only of opening the soil. The width of the furrow is determined by the moldboard (31). Harrows are usually simple bamboo-toothed harrows. For hauling purposes, sleds and carts are used, especially in remote regions.

The number of plows, harrows, sleds and carts on farms, according to the census of 1939, is given in table 13. In regions where rice culture predominates, a high percentage of farms had plows; in the Mountain Province only 19 percent owned plows, and in the provinces of Samar and Palawan it was less than 10 percent. For the country as a whole 61.7 percent of the farms possessed plows. In the rice region the number of harrows followed closely the number of plows, though there generally were fewer harrows than plows where commercial crops predominated. The number of sleds was large, but there were few carts.

Much of the labor on farms is done by hand, using simple tools. Probably the most useful single tool is the bolo, which is used to harvest sugarcane and which serves as axe, plane, knife, and occasionally as hammer. For cultivating the soil, hows are often used on the northern islands, and mattocks are used for digging root crops. Iron and steel shovels are also in use. Much mountain cultivation is done with an implement resembling a short, blunt sickle. Knife-like blades of different kinds, varying in different localities, are used for harvesting rice. Forks and rakes, mostly made of wood, are used in threshing operations.

Table 13.- FARM IMPLEMENTS: Number of Plows, Harrows, Carts and Sleds Reported, by Provinces, 1939 1/

	Farms	Plows		Harrows	Carts	Sleds
	(Number)	(Number)	(Percent of Farms Having)	(Number)	(Number)	(Number)
Luzon: Ilocos-Mountain Region						
Abra	13,329	17,065	91.3	15,552	1,803	13,052
Ilocos Norte	31,234	44,687	94.2	38,255	10,186	21,651
Ilocos Sur	27,163	34,521	90.3	27,074	9,862	18,952
La Union	25,739	30,570	88.3	26,570	3,348	18,630
Mountain Province	36,127	8,193	19.0	8,708	703	1,100
Luzon: Cagayan Valley Region						
Cagayan	36,561	50,322	92.1	41,639	8,717	26,902
Isabela	32,719	44,886	94.4	34,639	12,465	25,300
Nueva Vizcaya	10,114	11,448	88.9	9,484	2,003	7,614
Central Luzon-Zambales						
Bataan	6,305	7,171	78.6	6,670	1,689	1,863
Bulacan	36,014	40,909	89.5	34,512	6,925	19,852
Manila City	56	60	64.3	40	8	18
Nueva Ecija	78,319	89,089	89.6	72,696	19,845	55,415
Pampanga	23,628	27,710	66.2	24,198	8,277	10,410
Pangasinan	86,615	94,860	88.3	83,281	26,183	70,627
Rizal	14,149	17,851	82.0	12,517	915	10,143
Tarlac	28,651	36,314	93.3	29,312	10,655	24,877
Zambales	12,165	12,745	85.8	11,022	4,928	7,766
Southern Luzon Rice-Coconut Region						
Batangas	50,316	48,223	80.3	19,724	5,066	8,358
Cavite	22,463	23,658	84.1	14,442	1,484	5,350
Laguna	25,720	17,228	50.2	12,779	2,145	6,317
Tayabas	52,874	26,071	42.3	24,884	5,279	13,252
Southern Luzon Coconut-Abaca Region						
Albay	44,261	17,613	29.8	16,509	1,200	3,631
Camarines Norte	10,011	2,753	22.9	3,523	503	4,830
Camarines Sur	35,822	28,577	58.0	25,683	1,476	11,512
Sorsogon	31,688	8,592	23.1	9,249	523	2,180
Panay						
Antique	23,662	27,000	84.5	22,687	1,256	12,320
Capiz	43,527	40,439	69.2	33,105	1,379	14,403
Iloilo	66,915	79,555	84.9	62,336	4,048	44,577
Negros						
Occidental	35,896	50,392	69.9	28,599	8,882	8,375
Oriental	47,440	35,852	53.3	5,058	969	2,577
Mindoro	16,271	13,848	66.6	8,965	640	6,233
Romblon	14,521	8,274	46.1	5,873	478	3,630
Cebu	121,548	67,194	42.2	5,674	1,623	5,546
Bohol	63,388	55,511	64.9	29,475	1,215	14,537
Samar	63,194	8,022	8.9	8,020	612	5,681
Palawan	11,304	1,389	6.2	1,112	223	373
Sulu	20,384	16,866	65.4	6,655	58	677
Batanes	1,724	1,170	50.8	197	300	1,088
Masbate	17,723	11,991	47.4	3,543	262	3,612
Marinduque	9,931	6,973	59.9	4,645	293	1,888
Leyte	100,794	73,335	55.0	26,525	1,605	16,569
Mindanao						
Agusan	12,072	4,455	27.6	1,147	269	1,398
Bukidnon	6,561	4,996	53.3	3,162	299	910
Cotabato	25,018	16,794	51.4	9,430	1,784	6,966
Davao	26,251	4,091	11.7	1,200	1,337	3,466
Lanao	24,529	22,247	68.3	17,139	1,854	5,457
Occidental Misamis	25,650	22,007	66.4	3,257	2,475	11,037
Oriental Misamis	22,521	8,702	27.8	2,912	550	2,973
Surigao	28,982	13,493	40.0	9,689	676	4,194
Zamboanga	32,877	20,767	47.6	8,290	1,180	9,584
TOTAL	1,634,726	1,356,479	61.7	911,657	180,455	577,674

1/ Source: Census of the Philippines, 1939. Vol. II.

f. Fertilizers. Complete data regarding the fertilizer needs of soils of the Philippines are not yet available, but a number of experiments testing the responses of rice, sugarcane and other crops to applications of nitrogen, phosphorus and potash have been reported. The experiments with rice show that a large increase of yield was often obtained when adequate amounts of fertilizers were applied. One experiment showed a gain in yield of between 50 and 60 percent when a complete fertilizer (containing nitrogen, phosphorus and potash) was applied at the rate of 300 kilos per hectare (about 270 lbs. per acre); in another experiment, ammonium sulphate applied at the same rate gave an increase of more than 130 percent of the check plots; and a third experiment, using a complete fertilizer at half that rate, showed an increase of yield of around 30 percent. Experiments with sugarcane produced similar results. A complete fertilizer applied at the rate of 500 kilos per hectare (about 450 lbs. per acre) increased the yield of cane 69.3 percent. The same fertilizer in another experiment increased the yield 36.2 percent; and when the rate of application was doubled the yield was increased 63 percent. The number of experiments reported is not large enough to allow very specific conclusions, but it is clear from these results that at least some soils are strongly deficient in available nutrients and that large increases of yield may in such cases be obtained by applying adequate amounts of fertilizers.

On ordinary farms, however, large amounts of any kind of fertilizer were not commonly used, possibly because heretofore land has been so abundant that farmers were not forced to give much attention to fertilization. Rice straw left on the field was turned under, though sometimes first burned; and ashes from cooking stoves were used. It often was the custom, also, to burn rubbish or such things as coconut fronds on the field, particularly on upland fields, for the ash residue. In the caingin system of cultivation, the ash residue left after burning was relied upon entirely for fertilizers. Since most forms of livestock are not quartered regularly, supplies of stable manure were not as large as might be expected, even though the number of cattle was considerable. Green manure crops were not commonly used, and night soil was used only by the Chinese and Japanese farmers.

The commercial fertilizers used were almost entirely imported. Of the important forms, the average quantities imported between 1935 and 1939 follow, (shown by years in table 39, appendix):

Material	Metric Tons
Sulphate of Ammonia	35,939
Nitrate of Soda	365
Ammonium Phosphate	4,436 *
Superphosphate	775
Sulphate of Potash	606
Mixed Fertilizers	9,410
Other Chemical Fertilizers	3,241
Total	54,772

* Average 1938-1939.

These quantities are not large. Formosa, with less than half the number of acres of crops, used about 8 times as much chemical fertilizer during the same period. The reason for this slight use by the farmers of the Philippines is largely an economic one. Since agricultural food products are low in value, farmers can not profitably use imported chemical fertilizers, which now are used mainly on plantations, largely the sugar plantations.

g. Irrigation. Irrigation in the Philippines is chiefly irrigation of paddy rice. Some land is irrigated to grow other crops during the dry season, and the irrigation of sugarcane has been found to be profitable in some places; but the amount of land irrigated for such purposes is not yet large.

The irrigation of rice has a history dating back at least twelve or fifteen hundred years to the water systems established by Igorrotes of the Mountain Province. The terraces established by them are still one of the famous sights of the islands. Water systems on the Friar estates, some of which were purchased by the government shortly after the American occupation, have also been in existence for a long time in the provinee of Rizal, Bulacan, Cavite, Laguna, and Cebu.

The government of the Philippines more recently promoted the development of irrigation works. The program as originally drawn contemplated the irrigation of approximately 385,000 acres of land from funds realized through a $10,000,000 bond issue that was authorized by the Philippine legislature during 1922. Later, further projects were undertaken, all of them being gravity systems and mostly without the use of large storage reservoirs. In addition to these projects, there were also several municipal systems. Water rights have also been granted for the construction of a large number of private irrigation systems, the bulk of which serve a few acres only.

The amount of land classified as irrigated land is shown in table 7. As reported by the census of 1939, this was 516,155 hectares (1,275,419 acres). Not all of this was irrigated by means of water supplied through irrigation systems; a larger percentage derived its water directly from rainfall. Some irrigated land was found in all provinces, but 77 percent of the entire amount was found on the Island of Luzon. The central Luzon region alone accounted for 44 percent of the total. Approximately one-third of all of the cultivated land in the central Luzon region and in the Ilocos Mountain region was irrigated.

h. Yields. The average yield of palay for the 5-year period, 1935-1939, calculated on the basis of estimates of acreage and production by the Division of Statistics, Department of Agriculture and Commerce, has been found to be 21.3 bushels per acre. This includes both irrigated and upland rice. Separate figures for irrigated and upland rice for the year 1938 are available from the census, from which it is calculated that the average yield of lowland rice was 22.3 bushels per acre and the average yield of upland rice, 11.4 bushels, the average for the entire crop that year being 19.8 bushels per acre.

For comparison with other important rice growing regions, the following table gives the average yields of unmilled rice per acre for a comparable period:

Table 14.- PALAY: Average yields of different countries

Country	Aver. Bus. per acre, 1935-1939
Japan	75.4
Formosa	52.8
China (Aver. 1931-37)	50.3
Philippine Islands	21.3
Indo-China	22.1
Thailand	30.1
Burma	27.8
India	26.5
United States	49.8

Average yields of palay in the Philippines, therefore, appear to be about the same as those in Indo-China but lower than the average yields in other countries of Asia. Yields of other crops in the Philippines are also low. For example, the average yield of corn, for the 5-year period 1934-1938, is calculated to be 10.0 bushels per acre; and that of tobacco, for the same period, is calculated to be 438.6 pounds per acre, compared with 861.0 for the United States.

4. Subsistence Crops.

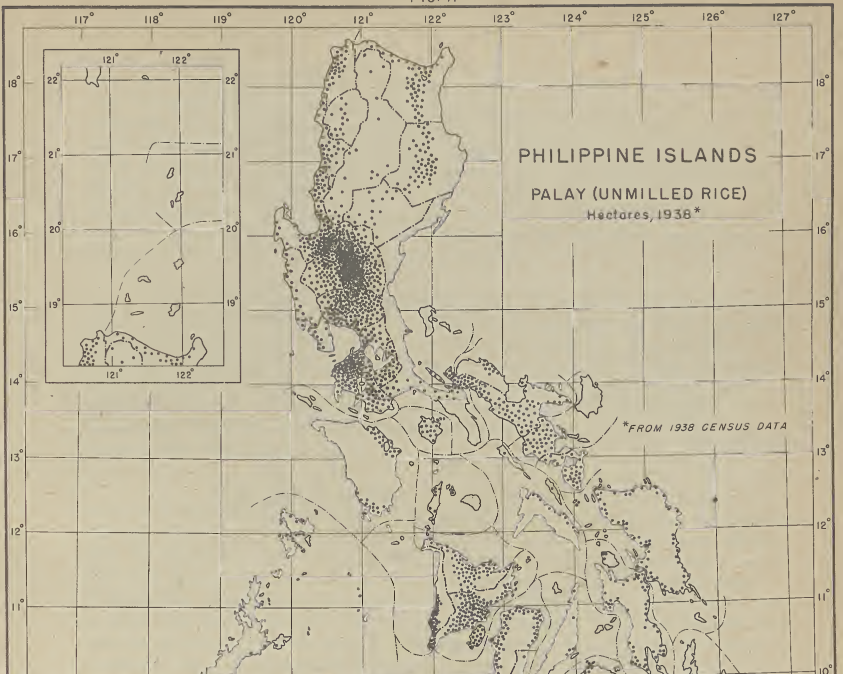
The crops included under this heading are those which are grown principally for human consumption. The most important ones are palay, corn, and sweet potatoes. Others of some importance are cassava, gabe, ubi, mungo beans, dry beans, peanuts, vegetables, and a variety of fruits. Between 55 and 60 percent of the total cultivated land is devoted principally to the raising of these crops, and their production meets a major part of the foodstuffs requirements of the domestic population.

a. Palay. Palay (the Philippine word for unmilled rice) is the most important and the most extensively cultivated crop in the Philippine Islands. It occupies approximately 40 percent of all the cultivated land; it is the source of the most important article of diet for a majority of the people; and its sale provides many farmers with the cash whereby they can purchase manufactured and other products which they do not produce. This crop is grown to some extent as a commercial enterprise on rice haciendas (or estates), mainly in Central Luzon and Panay, but most of it is grown by independent farmers on small farms, largely for home consumption. Lowland (irrigated) rice is the more important form, but upland (dryland) rice also is important.

Acreage and Production. As found by the census, there were 1,829,993 hectares (4,521,913 acres) of palay, in 1938. About 60 percent of this acreage was found on the island of Luzon, and 31 percent in the large surplus producing area of Central Luzon alone. Outside of Luzon, the largest amount was found on Panay (11.9 percent) and on Mindanao (10.1 percent). (Table 15 and figure 11) The total number of hectares in palay, as found by the census, was approximately 5 percent lower than the figure estimated by the Division of Statistics, Department of Agriculture and Commerce.

Total production in 1938, following the census, was 1,825,616 metric tons. The average harvest for the two years ending June 30, 1938 and June 30, 1939, as estimated by the Division of Statistics, was approximately 29 percent larger than this figure. About 67 percent of the entire crop was produced on Luzon, with 42.3 percent in the central Luzon area alone (Table 16). This is the large rice

FIG. 11



PHILIPPINE ISLANDS

PALAY (UNMILLED RICE)

Hectares, 1938*

*FROM 1938 CENSUS DATA

Each dot represents 1,000 hectares

TOTAL HECTARES 1,830,000

U. S. DEPARTMENT OF AGRICULTURE

NEG. 406 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

surplus region from which rice was shipped to southern Luzon and the Visayan Islands. If total production is divided by the acres planted, it is found that the average yield in this region was approximately 27 bushels per acre, in contrast with an average of 19.8 bushels per acre for the Philippines as a whole, that year. Yields in the Cagayan Valley and the Ilocos Mountain Regions were slightly above average; but yields for the remaining areas were below average, probably due in large part to the fact that the acreage of upland rice there was greater.

The importance of the upland form of rice is shown in the fact that its acreage in 1938, 423,144 hectares, was 23.1 percent of total acreage. Production was 243,393 metric tons, or 13.3 percent of total production. Some upland rice was grown in every province, and its acreage was as large as or larger than that in lowland rice in hilly, less highly developed provinces like Batangas, Cavite, Mindoro, Palawan, Sulu, Agusan, Bukidnon, Davao, Lanao, and Zamboanga.

Cultural Practices. It has been reported that nearly 1,000 distinct varieties of rice are grown in the Philippines, though tests by the Bureau of Plant Industry show that only about 100 of these may be classified as heavy or medium yielders. Various varieties are grown for different uses. For table use, ordinarily there is a preference for the long-grain type, but some prefer the round type. Varieties of glutinous rice are raised for making special dishes and preparations such as pastries and rice flakes. In the Mountain Province a red rice is used to make a fermented beverage.

In general, there are two seasons for planting lowland rice and one for upland rice. For lowland rice, the first crop is transplanted into the open field as early as May in Mindanao, but usually not before July in the Cagayan Valley. In most regions transplanting begins in June, and continues for two to four months. For the second crop, it usually begins in November, December, or January, and continues through January and February or later. Upland rice usually is planted from April through June, although practice differs in different regions. A schedule of the most general planting dates in the different regions is shown in table 17.

In planting lowland rice, the seed usually is sown in seedbeds, for which rich spots are selected. After being irrigated, the land is plowed and harrowed several times to cause

Table 15- PRINCIPAL SUBSISTENCE CROPS: Total Acreage, by provinces and regions, 1938 1/

Region	Palay		Corn		Sweet Potatoes		Mungo		Cassava		Peanuts		Dry Beans		Gabe	
	Hectares 2/	Percent of total	Hectares 2/	Percent of total	Hectares 2/	Percent of total	Hectares 2/	Percent of total	Hectares 2/	Percent of total	Hectares 2/	Percent of total	Hectares 2/	Percent of total	Hectares 2/	Percent of Total
Luzon: Ilocos-Mountain Region	114,368	6.3	19,069	2.4	17,465	14.5	1,214	4.3	793	2.0	726	6.0	1,603	22.8	514	4.4
Abra	12,764		5,239		170		23		27		63		166		18	
Ilocos Norte	27,585		4,734		441		846		250		262		251		75	
Ilocos Sur	25,945		6,409		786		69		60		194		314		16	
La Union	27,666		1,819		658		132		340		171		456		50	
Mountain Province	20,408		868		15,410		144		116		36		416		355	
Luzon: Cagayan Valley Region	111,276	6.1	62,563	7.8	2,306	1.9	2,024	7.2	443	1.1	2,161	17.8	903	12.9	365	3.1
Cagayan	49,146		31,162		294		776		107		962		383		179	
Isabela	47,087		29,864		378		1,219		244		1,123		358		149	
Nueva Vizcaya	15,043		1,537		1,634		29		92		76		162		37	
Central Luzon-Zambales	567,316	31.0	40,109	5.0	4,512	3.8	10,635	38.0	3,196	8.0	3,731	30.6	1,334	19.0	559	4.7
Bataan	10,963		326		307		11		19		137		20		9	
Bulacan	66,530		2,459		249		26		47		202		200		35	
Nueva Ecija	200,516		16,622		1,104		455		621		760		239		131	
Pampanga	63,791		2,108		398		40		621		300		68		117	
Pangasinan	121,587		16,115		1,376		8,983		1,215		1,992		556		131	
Rizal	19,569		568		203		13		79		86		81		29	
Tarlac	66,926		1,665		681		57		272		234		131		89	
Zambales	17,386		235		193		1,050		322		20		39		18	
Manila City	48		11		1		3/		.12		.25		.34		.01	
Southern Luzon: Rice-Coconut Region	185,213	10.1	22,949	2.9	1,831	1.5	2,995	10.7	1,845	4.6	2,056	16.9	648	9.2	691	5.9
Batangas	68,123		15,805		185		2,196		547		560		277		129	
Cavite	40,168		3,477		302		390		145		1,322		278		166	
Laguna	30,407		1,822		172		73		170		80		30		174	
Tayabas	46,515		1,845		1,172		336		983		94		63		222	
Southern Luzon, Coconut Abaca Region	118,726	6.5	5,879	.7	12,050	10.0	50	.2	2,890	7.3	390	3.2	79	1.1	756	6.4
Albay	30,718		2,908		5,855		8		498		149		13		307	
Camarines Norte	10,107		232		666		4		295		31		6		120	
Camarines Sur	51,862		1,682		2,974		35		661		182		49		163	
Sorsogon	26,039		1,057		2,555		3		1,436		28		11		166	
Panay	217,795	11.9	33,074	4.1	5,723	4.8	9,410	33.6	1,894	4.8	631	5.2	1,236	17.6	1,002	8.5
Antique	36,726		6,289		667		1,996		243		98		289		191	
Capiz	56,284		4,122		2,246		166		597		63		31		385	
IloilO	124,785		22,663		2,810		7,248		1,054		470		916		426	
Negros	70,893	3.9	118,514	14.8	2,855	2.4	300	1.1	1,650	4.2	293	2.4	518	7.4	628	5.3
Occidental	63,294		49,543		1,425		185		532		195		81		273	
Oriental	7,599		68,971		1,430		115		1,118		98		437		355	
Mindoro	31,105	1.7	1,381	.2	503	.4	41	.2	134	.3	29	.2	58	.8	104	.9
Romblon	10,322	.6	1,237	.2	749	.6	19	.1	286	.7	6	--	21	.3	95	.8
Cebu	6,130	0.3	175,929	22.0	3,388	2.8	608	2.2	2,201	5.5	311	2.6	70	1.0	658	5.6
Bohol	55,434	3.0	30,583	3.8	6,417	5.3	26	.1	1,604	4.0	59	.5	20	.3	240	2.0
Samar	55,690	3.0	4,518	.6	10,763	9.0	12	4/	1,742	4.4	49	.4	5	.1	1,022	8.7
Palawan	7,308	.4	593	.1	914	.8	11	4/	562	1.4	5	4/	50	.7	72	.6
Sulu	15,037	.8	5,940	.7	663	.6	16	.1	11,927	30.0	433	3.6	5	.1	65	.5
Batanes	153	--	111	--	310	.3	--	--	.31	4/	--	--	1	4/	10	.1
Masbate	8,385	.5	13,003	1.6	3,825	3.2	22	.1	2,134	5.4	106	.9	18	.3	230	2.0
Marinduque	12,800	.7	448	.1	486	.4	54	.2	68	.2	18	.1	11	.2	77	.7
Leyte	57,487	3.1	86,694	10.9	15,406	12.8	90	.3	1,114	2.8	256	2.1	20	.3	988	8.4
Mindanao	184,555	10.1	176,530	22.1	29,914	24.9	443	1.6	5.275	13.3	912	7.5	417	5.9	3,707	31.4
Agusan	7,029		8,657		4,109		38		189		19		19		381	
Bukidnon	3,657		11,094		922		12		351		195		56		131	
Cotabato	40,266		18,208		1,985		150		384		119		73		252	
Davao	14,362		16,498		8,343		82		802		49		159		954	
Lanao	44,195		29,264		1,792		30		807		221		9		204	
Occidental Misamis	10,757		37,041		943		27		334		53		16		676	
Oriental Misamis	5,453		24,102		2,876		10		238		78		30		241	
Surigao	30,187		4,247		5,580		15		280		12		9		289	
Zamboanga	28,649		27,419		3,364		79		1,890		166		46		579	
TOTAL	1,829,993	100.0	799,124	100.0	120,080	100.0	27,970	100.0	39,758	100.0	12,172	100.0	7,017	100.0	11,783	100.0

1/ Compiled from data in Census of the Philippines, 1939. Vol. II.
2/ Hectares X 2.471 = Acres.
3/ Less than .01 hectare.
4/ Less than .05 percent.

Table 16.- PRINCIPAL SUBSISTENCE CROPS: Production, by regions and provinces, 1938 1/

	Palay		Corn		Sweet Potatoes		Mungo		Cassava		Peanuts		Dry Beans		Gabe	
	Metric Tons 2/	Percent of Total	Metric Tons 3/	Percent of Total	Metric Tons 4/	Percent of Total	Metric Tons 4/	Percent of Total	Metric Tons 4/	Percent of Total	Metric Tons 4/	Percent of Total	Metric Tons 4/	Percent of Total	Metric Tons 4/	Percent of Total
Luzon: Ilocos Mountain Region	116,621	6.4	14,240	3.1	176,284	43.3	572	8.1	2,775	1.6	449	6.9	858	27.6	1,807	7.8
Abra	11,279		4,400		464		9		83		39		65		49	
Ilocos Norte	37,343		4,004		1,626		402		803		164		129		227	
Ilocos Sur	20,660		3,905		2,843		35		216		112		149		57	
La Union	23,144		1,193		1,894		62		1,230		111		215		206	
Mountain Province	24,195		738		169,457		64		443		23		300		1,268	
Luzon: Cagayan Valley Region	125,545	6.9	65,850	4.3	18,597	4.6	768	10.9	1,009	.6	1,154	17.7	420	13.5	808	3.5
Cagayan	47,246		31,278		586		290		235		443		158		392	
Isabela	51,175		32,897		1,018		465		564		666		176		324	
Nueva Vizcaya	27,124		1,675		16,993		13		210		45		86		92	
Central Luzon-Zambales	772,866	42.3	30,165	6.6	12,998	3.2	3,010	42.9	10,105	6.0	2,469	37.8	733	23.6	1,590	6.9
Bataan	16,017		184		670		4		48		63		12		37	
Bulacan	96,488		1,844		641		11		98		140		112		97	
Manila City	79		6		3		--		.4		.3		.2		--	
Nueva Ecija	301,823		12,073		2,376		100		1,265		453		152		334	
Pampanga	75,106		1,064		895		14		636		164		35		227	
Pangasinan	161,766		13,437		5,029		2,432		6,042		1,457		282		552	
Rizal	24,226		384		457		4		231		57		51		70	
Tarlac	77,511		1,009		2,382		32		510		127		65		211	
Zambales	19,850		164		545		413		1,275		8		24		62	
Southern-Luzon Rice-Coconut-Region	107,223	5.9	8,284	1.8	2,679	.7	656	9.3	3,199	1.9	802	12.3	294	9.5	1,539	6.7
Batangas	19,187		5,638		441		484		1,394		205		98		322	
Cavite	24,889		1,674		554		85		292		519		149		346	
Laguna	33,352		909		456		27		546		42		15		604	
Tayabas	29,795		663		1,228		60		967		36		32		267	
Southern-Luzon Coconut-Abaca Region	100,169	5.5	3,806	.8	19,547	4.8	15	.2	4,296	2.5	194	3.0	46	1.5	1,224	5.3
Albay	26,587		2,060		12,043		3		751		71		7		477	
Camarines Norte	8,313		120		672		1		425		10		2		154	
Camarines Sur	44,010		1,034		3,783		10		1,312		98		31		331	
Sorsogon	21,259		592		3,049		1		1,808		15		6		262	
Panay	137,429	10.2	13,296	2.9	7,660	1.9	1,504	21.4	2,985	1.8	244	3.7	313	10.1	1,850	8.0
Antique	20,504		2,317		977		325		448		35		63		348	
Capiz	61,394		2,368		3,276		50		1,007		39		22		785	
Iloilo	105,531		8,611		3,407		1,129		1,530		170		228		717	
Negros	69,929	3.8	52,681	11.4	5,078	1.3	116	1.7	3,113	1.8	138	2.1	141	4.5	1,289	5.6
Occidental Negros	63,883		22,011		2,400		76		957		92		42		533	
Oriental Negros	6,046		30,670		2,678		40		2,156		46		99		756	
Mindoro	19,990	1.1	758	.2	429	.1	9	.1	117	.1	7	.1	20	.6	91	.4
Romblon	4,568	.2	466	.1	821	.2	5	.1	464	.3	2	2/	13	.4	168	.7
Cebu	3,466	.2	53,323	11.6	4,206	1.0	131	1.9	3,266	1.9	126	1.9	29	.9	959	4.2
Bohol	30,455	1.7	13,201	2.9	11,483	2.8	8	.1	2,630	1.6	24	.4	9	.3	585	2.5
Samar	43,636	2.4	3,781	.8	29,223	7.2	5	.1	5,605	3.3	28	.4	3	.1	2,964	12.8

(Continued on next page)

Table 16 .- PRINCIPAL SUBSISTENCE CROPS: Production, by regions and provinces, 1938 1/

	Palay		Corn		Sweet Potatoes		Mungo		Cassava		Peanuts		Dry Beans		Gabe	
	Metric 2/ tons	Percent of Total	Metric 3/ tons	Percent of Total	Metric 4/ tons	Percent of Total	Metric 4/ tons	Percent of Total	Metric 4/ Tons	Percent of Total	Metric 4/ tons	Percent of Total	Metric 4/ tons	Percent of Total	Metric 4/ tons	Percent of Total
Palawan	4,775	.3	368	.1	1,358	.3	4	.1	1,147	.7	2	2/	13	.4	134	.6
Sulu	17,824	1.0	3,788	.8	3,687	.9	6	.1	110,925	65.5	238	3.7	4	.1	108	.5
Batanes	65	2/	104	2/	1,161	.3	-	-	1	2/	-	-	.1	-	31	.1
Masbate	3,604	.2	6,510	1.4	5,800	1.4	10	.1	4,016	2.4	38	.6	8	.3	310	1.3
Marinduque	5,693	.3	175	2/	418	.1	10	.1	124	0.1	6	.1	6	.2	99	.4
Leyte	44,287	2.4	59,338	12.9	40,005	9.8	32	.5	2,533	1.5	137	2.1	13	.4	1,815	7.9
Mindanao	167,491	9.2	130,430	28.3	65,420	16.1	159	2.3	10,956	6.5	469	7.2	186	6.0	5,731	24.8
Agusan	5,540		7,339		11,497		18		430		7		8		830	
Bukidnon	2,452		7,881		1,469		4		543		115		35		182	
Cotabato	48,046		18,685		2,715		64		606		58		31		303	
Davao	9,248		17,576		15,170		25		997		21		64		1,404	
Lanao	44,324		21,396		4,163		10		2,116		150		5		224	
Occidental Misamis	10,412		22,258		1,945		8		1,135		17		8		576	
Oriental Misamis	4.645		13,463		7,435		4		509		29		16		669	
Surigao	21,254		2,866		16,266		7		883		8		5		638	
Zamboanga	21,570		18,966		4,760		19		3,737		64		14		905	
Total	1,825,616	100.0	460,564	100.0	406,854	100.0	7,020	100.0	169,266	100.0	6,527	100.0	3,109	100.0	23,102	100.0

1/ Compiled from data in Census of The Philippines, 1939, Vol. II.
2/ Converted from Cavanes, 1 cavan equals 44 kilos.
3/ Converted from Cavanes, 1 cavan equals 58 kilos.
4/ Converted from kilos.
5/ Less than .05 percent

Table 17.- PALAY: The most general planting and harvesting dates, by regions

	First Crop		Second Crop		Upland Crop	
	Planting 1/	Harvesting	Planting 1/	Harvesting	Planting	Harvesting
Ilocus-Mountain Region	June-Aug.	Oct.-Nov.	Jan.-Feb.	May-June	April-June	Sept.-Oct.
Cagayan Valley Region	July-Sept.	Jan.-Feb.	Feb.-Mar.	June-July	May-Sept.	Sept.-Dec.
Central Luzon-Zambales	June-Aug.	Oct.-Dec.	Jan.-Feb.	May-June	May-June	Sept.-Oct.
Southern Luzon Rice-Coconut Region	June-Aug.	Oct.-Jan.	Feb.-April	July-Sept.	April-June	Sept.-Nov.
Southern Luzon Coconut-Abaca Region	June-July	Oct.-Nov.	Sept.-Dec.	Feb.-Mar.	May-June	Sept.-Oct.
East Visayan 2/ Region	June-July	Oct.-Nov.	Nov.-Jan.	Mar.-May	Mar.-May	Oct.-Nov.
West Visayan Region 3/	June-July	Oct.-Nov.	Dec.-Jan.	Mar.-April	April-June	Aug.-Oct.
Mindanao-Sulu Region 4/	May-July	Sept.-Nov.	Not very definite		April-June	Sept.-Nov.

Source: Census of the Philippines, 1939. Vol. III.

1/ Refers to date of transplanting into open field.

2/ Masbate, Samar, and Leyte

3/ Mindoro, Palawan, Romblon, Marinduque, Panay (Capiz, Iloilo, and Antique), Negros (Occidental and Oriental) Cebu and Bohol.

4/ All of Mindanao and Sulu.

puddling. In some cases seed is planted over 2 or 3 layers of banana leaves which are placed on the prepared surface and covered with soil. This appears to hasten growth and make it possible to take up the plants without injury to roots. In transplanting, which is done from 25 to 40 days after seeding, 3 to 6 seedlings are placed in one hill, sometimes to the accompaniment of local vocal and instrumental music for the encouragement of the workers. The routine care thereafter consists mainly in maintaining a proper supply of water, an occasional weeding, and the repairing of dikes.

Upland rice may be grown on slopes, like corn, although the more level land is commonly chosen. In preparation for its planting the soil is plowed and harrowed, and seed is broadcast over the surface or sown in shallow furrows at the beginning of the rainy season. Sowing is followed by harrowing to cover the seed. Weeds are removed by hand. Rice also is raised by Caingin methods of cultivation (See discussion page 13).

Rice growers have to contend with certain insect pests. Migratory locusts appear at intervals and are said to have become serious pests during the war years. The rice stem borer (Schoenobius punctellus Zell), the army cutworm (Spodoptera mauritia Boisd) and the rice caseworm (Nymphula depunctalis) are also major pests. Among the diseases, the rice stem rot causes considerable damage each year. Other diseases, in descending order of importance, are: Helminthosporiose, sheath rot, bunt, Rhizoctonia blight, straighthead, seedling blight, Fusarium disease, green smut, blast, brown linear spot and leaf spot. These pests and diseases often constitute a serious menace to production, which is intensified owing to the difficulties in following a crop rotation and the presence of considerable grass and wasteland. The common practice of burning straw and stubble probably helps in the control of some of these posts.

Harvesting and Threshing. Harvesting usually takes place in four to six months after planting and as much as possible during the dry season. The most general dates of harvesting in the different regions are shown in table 17.

Practically all the rice is harvested by hand. The most commonly used implement, particularly in the main rice producing regions, is a sickle, known as "karit." With this implement, the heads and about one-third the length of the straw are cut off and tied into bundles, which then either are taken to the farmstead or left on dikes in the field for further drying. In scattered areas of rice cultivation, particularly where bearded rice is grown, often just the panicles are cut, with the use of a small knife called "yatab." Where outside labor is employed in the harvesting, the work usually is done on a share basis, whereby the harvesters receive from one-twelfth to one-fifth of the crop for their services.

Threshing is sometimes done on a raised platform made of bamboo lattice, some six to eight feet above the ground, placed either in the field or at the farmstead. The grain is loosened from the panicle by the feet and then falls to the ground, being sifted by the wind as it falls. Rice also is threshed by men or carabaos treading out the grain on pounded earth or cement floors, by beating the rice heads against a hard object, or by flailing. A number of Japanese foot-treadle threshers also have been used.

Modern rice threshers were formerly used only by large plantation owners. Lately private individuals have operated threshing outfits, accepting jobs for which they charged from 5 to 7 percent of the grain. This is particularly common in Nueva Ecija and Bulacan Provinces. When threshed with modern machinery bundles may be piled in large stacks, with the grain placed on the inside, and left for as long as three months before threshing.

Milling. The rice grain as harvested, termed "palay" in the Philippines, is also known as unmilled rice, rough rice, or paddy rice. This grain contains an outer hull, which is distinct from the seed itself, and a bran layer which forms an outer covering of the seed. Rice keeps best in the palay form. It rapidly becomes rancid when the hull is removed, because of the high fat content of the bran layer and the germ, and even in the completely milled condition it can be kept in good condition in the Philippines only from 60 to 90 days. To prepare it for eating, however, one must remove the hull, and the brownish bran layer is also partially or wholly removed. The removal of these parts of the seed is accomplished by the process of milling, completed in one operation in a modern mill or in several steps by the simple processes used on farms. The finished product is the rice of commerce, commonly referred to as milled rice.

In the Philippines, much of the milling is still done on farms by pounding the grain in a wooden mortar with a wooden pestle, a method particularly followed by the poorer farmers and by those in sections which are remote from mills. After pounding, winnowing is done by shaking in a basket-tray. This slow, inexpensive practice leaves an inferior polish, but it is preferable from the standpoint of nutrition since it retains more of the protein, fats and minerals present in the bran layers.

Modern rice mills, particularly in the principal rice-growing provinces, gradually are superseding this method of milling. Many communities and haciendas now have small mills operated by six to eight horsepower engines. It was estimated that before the war there were several hundred such mills which cleaned rice for local use. In larger centers there are a smaller number of much larger modern mills.

By-products. In the process of milling, there are certain by-products which are carefully saved and utilized, and sometimes these are taken by the mill as payment for the milling.

a. Rice Hulls. These are the coarse outer covering of the grain which are readily removed from the grain proper. Hulls sometimes are mixed with the rice bran and used as a feed for livestock. They also are used as a fuel in many mills, and the ashes then are used as a fertilizer. Sometimes the hulls are thrown into the main irrigation canals, whence they are carried into the fields.

b. Rice Meal. This by-product sometimes is called broken rice or "binlid." The amount depends upon the adjustment of the mill and the condition of the grain. It contains broken kernels of rice mixed with a certain amount of finer meal. When palay heads are cut before fully ripe or if not properly cured, the kernel becomes chalky and breaks up in the process of milling, and overdrying will cause the kernels to break excessively. A large percentage of the germ or embryo of the kernel is also found mixed with the broken grains. This is considered a nutritious and palatable food, but its high fat content causes it to turn rancid in a short time. It now is used chiefly as an ingredient in the feed for cattle, pigs, and chickens, but it can be used in the manufacture of starch and in the preparation of dishes for human consumption.

c. Rice Bran. This is an outer layer on the grain itself, which contains most of the protein and also a high percentage of the fat. Its output is especially abundant when the mill is not adjusted well. It is the source of a product, known as tiqui-tiqui, which is an effective antidote for beri-beri. Rice bran often is mixed with hulls as a livestock feed, and it may be mixed with ground corn, cooked cassava, sweet potatoes, or finely chopped banana stalks as a hog feed.

Marketing. The problem of marketing was particularly important in large producing areas, like Central Luzon, which had a surplus for the use of cities and deficit provinces. In general, the surplus of Central Luzon, together with quantities imported through the port of Manila, made up a large part of the rice used to meet the deficit in southern Luzon and islands to the south. Minor surpluses that may have existed in Iloilo (Panay) or Lanao and Cotabato (Mindanao), went mainly into nearby provinces.

Shipments came into Manila by rail, truck and water, though mainly by rail and truck. The largest quantities appear to have come from Nueva Ecija, Tarlac and Pangasinan. Out-shipments went largely by water, to a large number of provinces. Particularly large quantities went to Cebu, Davao, Albay and Negros. The peak seasons for receipts in Manila were January and February, and July, August and September. These also were the periods of greatest out-shipment. The data on rice movement as reported for 1940 (Tables 18 and 19), although incomplete, give some indication of the details of this movement.

The whole system of buying and selling rice has been largely in the hands of Chinese merchants who milled, stored, imported and distributed rice. Through their hands the domestic production passed into consumption, and the imports were distributed. The majority of these merchants were independent, but all worked closely together on the basis of a common understanding. The investment of these merchants in milling, importing, storing, buying and distributing facilities was estimated, about 1926, to total approximately P 150,000,000.

The grower's surplus rice, the bulk of which usually left the farm between January and April, was in part sold outright to the merchants, and the rest was stored in their warehouses, against warehouse receipts, for later sale. Upon receipt of orders, the Chinese merchant milled and shipped the palay to associates in Manila or other secondary markets, but the actual retailing was done by both Chinese and Filipinos.

Although this organization of Chinese merchants appears to have supplied an efficient collection and distribution system, some dissatisfaction was felt concerning it that helped lead to the establishment of the National Rice and Grain Corporation, discussed on page 114, which in part was designed to loosen the control of the Chinese merchants on the rice trade. Nevertheless, these merchants continued to handle a large part of the business until the Japanese attack in 1941.

Table 18.-RICE: Monthly Arrivals and Shipments of Rice to and from Manila, by kind of transportation: 1940 1/
(In cavanes of 56 kilos)

Month	Arrivals by---			Shipments by---		
	Water	Rail	Truck	Water	Rail	Truck
January	125	165,868	Not reported	141,473	Not reported	Not reported
February	266	121,479		117,047		
March	211	108,169		115,389		
April	770	111,925		103,613		
May	-	103,411		169,825		
June	3,611	93,877		118,905		
July	4,512	149,038		142,888		
August	977	143,714	83,490	111,142		
September	1,107	130,422	114,450	83,859		
October	5,982	83,441	91,107	59,301		
November	14,205	59,428	71,322	21,453		
December	35,758	78,165	63,102	19,941		
Total	67,524	1,348,937	423,471	1,204,836		

1/ Commonwealth of the Philippines, Bureau of the Census and Statistics. Yearbook of Philippine Statistics: 1940. Manila, 1941.

Table 19.-RICE: Arrivals and Shipments to and from Manila, by kind of transportation,, by provinces, 1940 1/

(In cavanes of 56 kilos)

Province	Arrivals by----			Shipments by----		
	Water	Rail	Truck 2/	Water	Rail 2/	Truck 2/
Luzon: Ilocos-Mountain Region						
Abra	-	-		-		
Ilocos Norte	-	-		-		
Ilocos Sur	-	-		250		
La Union	-	-		-		
Mountain Province	-	-		-		
Luzon: Cagayan Valley Region						
Cagayan	7,219	-		220		
Isabela	-	-		-		
Nueva Vizcaya	-	-		-		
Central Luzon Zambales						
Bataan	-	-		-		
Bulacan	-	64,226		-		
Manila City	-	-		-		
Nueva Ecija	-	788,174		-		
Pampanga	-	20,812		-		
Pangasinan	-	169,363		-		
Rizal	-	-		-		
Tarlac	-	306,362		-		
Zambales	-	-		-		
Southern Luzon Rice-Coconut Region						
Batangas	-	-		1,211		
Cavite	-	-		-		
Laguna	-	-		-		
Tayabas	-	-		10,029		
Southern-Luzon Coconut-Abaca Region						
Albay	-	-		166,170		
Camarines Norte	-	-		41,730		
Camarines Sur	-	-		8,834		
Sorsogon	207	-		74,637		
Panay						
Antique	-	-		-		
Capiz	6,269	-		34,697		
Iloilo	5,517	-		33,011		
Negros						
Occidental	120	-		110,263		
Oriental	35	-		14,295		

(Continued)

Table 19.-(Continued - 2 -)

(In cavanes of 56 kilos)

Province	Arrivals by--- Water	Rail	Truck 2/	Shipments by---- Water	Rail 2/	Truck 2/
Mindoro	2	-		23,462		
Romblon	-	-		14,433		
Cebu	5,977	-		179,480		
Bohol	-	-		10,207		
Samar	-	-		39,973		
Palawan	-	-		71,797		
Sulu	-	-		15,799		
Batanes	-	-		1,211		
Masbate	-	-		71,189		
Marinduque	-	-		36,375		
Leyte	1,744	-		7,994		
Mindanao						
Agusan	-	-		250		
Bukidnon	-	-		-		
Cotabato	40,434	-		7,384		
Davao	-	-		175,487		
Lanao	-	-		560		
Occidental Misamis	-	-		2,104		
Oriental Misamis	-	-		7,641		
Surigao	-	-		18,412		
Zamboanga	-	-		26,740		
Total	67,524	1,348,937		1,204,836		

1/ Commonwealth of the Philippines, Bureau of the Census and Statistics. Yearbook of Philippine Statistics: 1940. Manila, 1941.

2/ No figures were reported.

Strictly speaking there were no established grades of rice, but there evolved a rough classification, which was entirely local but which was thoroughly understood by and served the trade and the public. These grades can be designated as follows:

Superior: This is a specially tasty or aromatic rice for rich consumers.

First Grade: This is a very good quality rice, uniform and white, used by salaried workers and by those to whom a few cents more or less makes little difference.

Second Grade: This grade makes up a very large proportion of the total output of the Islands, and is used almost universally by the laboring classes. It is a milled rice, considered slightly superior to the standard No. 2 Saigon rice.

Third Grade: This is a very poor quality rice, made up of a mixture of coarse, red and broken grains. It generally is used for animal food, starch making, and numerous miscellaneous purposes, although it also is consumed by the very poor.

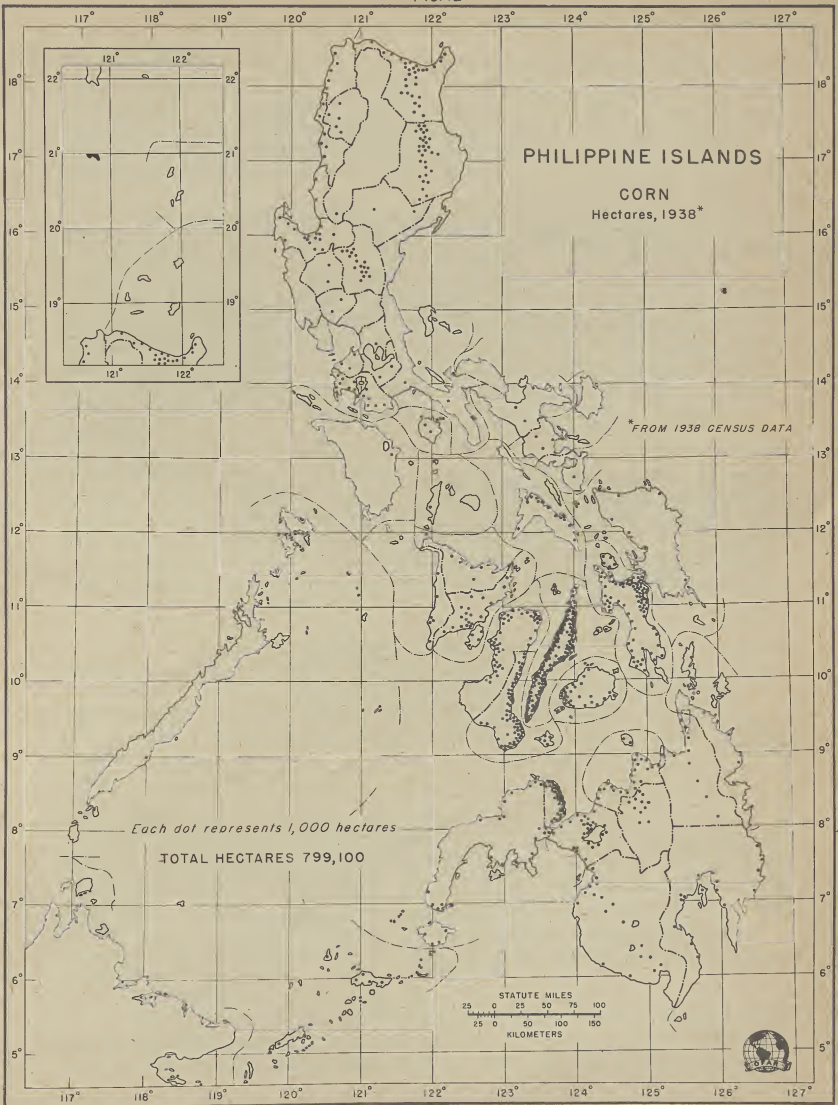
From a quantity standpoint, the relative production of each of these grades has been estimated as follows:

Superior	8%
First Grade	20%
Second Grade	60%
Third Grade	12%

b. Corn. Corn is one of the two chief food crops of the Philippines. It is grown to some extent upon the uplands of the climatic belt which has wet and dry seasons, but it is grown more extensively in the areas which have no pronounced dry season. The varieties grown are of the flint type, both yellow and white. Ears are short, stubby, somewhat cone-shaped, short-grained and thick-cobbed. Some corn is harvested and eaten in the late green stage, as roasting ears, but most of the acreage is harvested in the mature stage. The dried corn is ground and eaten in various forms, very much like rice.

Acreage and Production. The total acreage of corn harvested for grain in 1938, according to census figures, was 799,124 hectares (1,974,636 acres), or approximately 44 percent of the acreage of palay. About 22 percent of this acreage was in the one province of Cebu, where corn occupied over half of all the

FIG. 12



U. S. DEPARTMENT OF AGRICULTURE

NEG. 408 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

cultivated land. A large part of the remaining acreage was in Negros, Leyte and on the Island of Mindanao, which together accounted for 47.8 percent of the total acreage. Although the total quantity was relatively small, corn was also a major crop of Bohol and Masbate, and of Isabela and Cagayan Provinces of northeastern Luzon (Table 15 and figure 12).

The total production of corn in 1938 was reported to be 460,564 metric tons. This is only about 25 percent of the tonnage of palay produced, reflecting the low average yield of corn commonly obtained. Average yields would appear to vary greatly in the different provinces. Although Cebu accounted for 22 percent of the total acreage of corn its production, coming from relatively exhausted soil, was only 11.6 percent of the total. Mindanao, having 22.1 percent of the total acreage, raised 28.3 percent of the total production. Leyte, containing 10.9 percent of the total acreage, produced 12.9 percent of the total production (Tables 15 and 16).

Due to favorable climatic conditions it is possible to raise several crops of corn in one year, and three planting and harvesting seasons are commonly recognized. The third and least important of them accounts for about 11 percent of the total acreage and 8 percent of the total production; whereas, the first and most important crop includes about 55 percent of the total acreage and 60 percent of the total production.

Cultural Practices. The first crop of corn is planted during the early months of the year, from as early as January to as late as May or June. The second crop originates from a planting which usually is made between September and November. Harvesting follows about three months after planting. The most general planting and harvesting dates, for both the first and the second crops, are shown in table 20.

Planting and cultivation methods are similar to those described for upland rice. After the land has been plowed and harrowed, the seed is scattered in furrows, where it is covered with soil by means of a harrow or hoe. In Caingin cultivation, small holes, into which the seed is dropped, are made in the soil with a stick. The removal of weeds is done almost entirely with a bolo or other hand tool, although the native plow may be drawn through the middle of the row to serve as a cultivator.

The control of insect pests is a serious problem of corn raising in the Philippines. Corn borers and ear worms are very destructive in the field. Local varieties of corn, having a tight husk, are

Table 20 .- CORN: The most general planting and harvesting dates, by regions

Region	First Crop Planting	First Crop Harvesting	Second Crop Planting	Second Crop Harvesting
Ilocos-Mountain Region	Mar.-May	June-Aug.	Sept.-Nov.	Dec.-Feb.
Cagayan Valley and Batanes	May-June	Aug.-Sept.	Nov.-Jan.	Mar.-April
Central Luzon-Zambales	April-May	July-Aug.	Sept.-Dec.	Dec.-Mar.
Southern Luzon-Rice-Coconut Region	May	August	Nov.-Jan.	Feb.-April
Southern Luzon-Coconut-Abaca Region	Little corn grown			
East Visayan Region 1/	Jan.-April	April-Aug.	June-Sept.	Sept-Dec.
West Visayan 2/	April-May	July-Aug.	Sept.-Nov.	Dec.-Feb.
Mindanao-Sulu Region	Mar.-May	July-Aug.	Sept.-Oct.	Jan.-Feb.

Source: Census of the Philippines, 1939. Vol. III.

1/ Masbate, Samar, and Leyte.
2/ Mindoro, Palawan, Romblon, Marinduque, Panay (Capiz, Iloilo, and Antique), Negros (Occidental and Oriental) Cebu and Bohol.

more resistant to these pests than are most of the imported varieties. After harvest, a considerable amount of damage to the stored grain may be done by weevils.

c. Root Crops. Root crops form an important article of the diet. The most important one is the sweet potato, generally called camotes in the Philippines, which is grown to some extent in every province. It is particularly important in the Ilocos-Mountain Region of Luzon, where it constitutes an unusually large part of the diet of the mountain people. Relatively little of this crop is grown in the important rice region of central Luzon, but it is found well scattered throughout the islands of the central and southern part of the Philippines. (Figure 13) The total acreage, in 1938, according to census figures, was 120,080 hectares, and production was reported to total 406,854 metric tons (Tables 15 and 16).

Another important root crop is cassava, known also in different parts of the world as tapioca, mandioca, manoic or yuca. While grown extensively in places like the Netherlands East Indies as a source of tapioca starch, cassava is grown primarily in the Philippines as a source of food. Cassava is a tall plant, with a brittle woody stalk, which grows well in mountain areas of the Philippines where rainfall is distributed throughout the year. The edible roots mature after 10 to 14 months of growth; but for eating they usually are harvested at 8 to 10 months, when still tender.

Recently cassava has become to some extent popular in the Philippines as a source of starch, and it also has been manufactured into cassava flour. Some hope has been entertained that, as a flour, cassava may eventually help to supply a part of the demand now filled with imported wheat flour. Having no gluten, however, it is not suitable for making raised bread.

For consumption in the fresh state, attention needs to be given to the fact that certain forms of cassava contain poisonous substances which, however, are readily driven off if the root is first peeled and then cooked by boiling. It appears that two forms of this root exist, one of which is not poisonous, but both forms are entirely safe if prepared as stated. It is necessary, also, to eat this root very shortly after digging, since it turns black when detached from the plant.

Approximately 30 percent of the total acreage was planted in Sulu Province, in 1938, but some was grown in every province (Table 15).

Several other root crops are grown widely, of which gabe (Taro) or gabi, is the most important. While gabe has a total acreage and production much smaller than that of either sweet potatoes or cassava, it forms an appreciable item of the diet in many places. Its top and stem may also be prepared as a vegetable. Two other common root crops are known as ubi and tugue, both of which are yams. The above-ground part of the plant is a vine which is supported on poles or which climbs on other plants.

Irish potatoes do not thrive in regions of low elevation. Only a small quantity was produced in the Philippines, and these were raised almost entirely in regions of high elevation where temperate conditions prevail. Other root crops grown include local types, such as galiang, sinkimas, yautia, and arrowroot.

d. Legumes. Under this heading are included principally, mungo beans, peanuts and "dry beans." Although the acreage and production of these crops are small compared with other crops described, they still are of some significance.

The most important of the legumes is the mungo bean (Phaseolus aureus Rxb.), a small short-seasoned bean which is yellow, black or green in color. In places such as Pangasinan, Tarlac and Ilocos Provinces the dried beans of this crop, at certain seasons of the year, provide an important source of cheap protein for the farmers. Commonly, mungo beans are planted as a second crop following the harvest of lowland rice, or corn, and they also can be grown on the dikes of paddy fields. Where there are wet and dry seasons they can be planted twice a year, at the start and at the close of the rainy season. They generally are grown where rice is grown, approximately 38 percent of the 27,970 hectares of mungo beans being planted in the Central Luzon region alone.

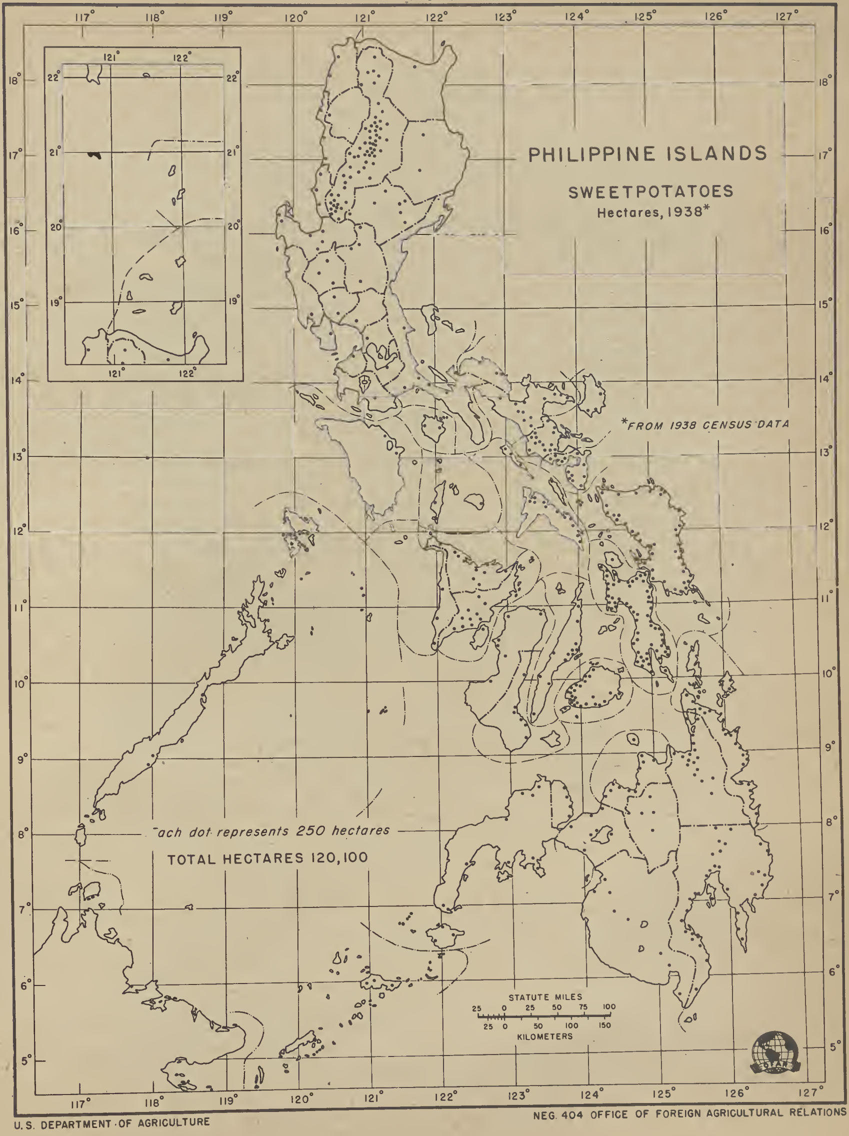
Another group of legumes grown for food purposes is described as "dry beans," This really includes a number of types of peas and beans, like the cowpea, which are grown mainly on northern and central Luzon, and on Panay. In 1938, 7,017 hectares were reported to be planted to this crop, producing 3,109 metric tons of beans. A total of 570 hectares also was reported in soybeans.

Peanuts were planted on 12,172 hectares of land. The Philippines formerly was a net importer of peanuts, but became a small net exporter in 1937 and 1938. The total production of peanuts in 1938 was reported to be 3,109 metric tons, with a large proportion grown on Luzon, particularly in central Luzon.

e. Fruits. The common fruits of the Philippines include bananas, pineapples, papayas, mangoes, citrus, and some minor tropical fruits. An indication of the quantity produced of each is given in the data of table 21.

RESTRICTED

FIG. 13



U. S. DEPARTMENT OF AGRICULTURE

NEG. 404 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

RESTRICTED

Table 21 .- FRUIT: Total number of trees and production for year ending June 30, 1938

Fruit	Bearing Trees	Production
	(Number)	(Thousand fruits)
Pineapple	-	18,222
Banana	-	47,858 1/
Papaya	1,562,020	27,948
Mango	409,890	103,434
Mandarin	281,210	25,757
Orange	176,060	10,040
Pummelo	157,630	8,538
Chico	53,150	13,173
Custardapple (Anonas)	161,450	3,982 2/
Lanzone	184,240	219 3/
Soursop (Guanabano)	249,830	4,013
Sugar Apple (Ates)	756,110	16,948

Source: Division of Statistics, Department of Agriculture and Commerce. Bulletin of Philippine Statistics, Vol. 6, 1939.

1/ Bunches. (Thousand)
2/ Kilos. (Thousand)
3/ Kaings. (Thousand)

From the point of view of its acreage and the total quantity of its production, the banana is by far the most important fruit of the Philippines, with nearly 48 million bunches produced during the year ending June 30, 1938. Fewer bananas are planted where high winds are to be expected. The most important producing centers were Negros, Bohol, Leyte, and Panay (Iloilo and Antique). Large quantities also were produced in a number of provinces of central Luzon; while smaller quantities were produced in practically all provinces of the Philippines. There are many varieties, ranging from the giant "Tindok," a cooking variety, to the well-flavored desert varieties.

The pineapple is grown for canning on a commercial scale in Bukidnon Province, Mindanao, largely for the Philippine Packing Corporation, owned and operated by the Del Monte Company. Offices and the cannery are in Bugo, Misamis Oriental. In 1938, 2,313 hectares were reported growing in Bukidnon, where conditions are considered excellent for pineapple production. Smaller quantities of pineapples, consumed as fresh fruit, are raised in practically all provinces but particularly on Leyte, Samar and several provinces of Luzon, including Tayabas, Batangas, Pangasinan and Mountain. Some pineapple also was grown for fiber.

Other important tropical fruits grown widely in the Philippines are the papaya and mango. Papayas are well distributed throughout the islands, with the largest number of trees found where high winds do not regularly occur. Especially large quantities are produced in Cebu. Mangoes also are grown widely, but the largest quantities are produced on Panay and in the Luzon provinces of Bulacan, Nueva Ecija and Pangasinan.

Citrus fruits are represented by mandarins (tangerines), oranges and pummelos (pomelos). These fruits usually are raised at mid-altitudes, where sub-tropical conditions prevail. In 1938 there were a total of approximately 600,000 bearing trees. Nearly half of all the mandarin trees were in the one province of Batangas. Other important production areas were in Ilocos Norte, Tayabas, Bukidnon and Lanao Provinces. The largest center for oranges was on Cebu; other centers were in Ilocos Norte, Albay and Batangas. Ilocos Norte produced the largest number of pummelos, but other important centers for the production of this fruit were in La Union, Pangasinan, Tayabas, and Cebu.

Lanzones, a fruit distinctly resembling a sweet plum, are popular in season. The remaining tropical fruits — chicos, custard apple, soursop, and sugar apple — are raised in regions of low elevation throughout the islands.

While not strictly in the same category, fresh coconuts used for food may properly be mentioned here. The young nuts are eaten fresh from the tree, or served in numerous native dishes. The grated meat at various stages of maturity, mixed with brown sugar, forms the basis for a popular confection. The ripe nuts may also be grated and mixed with water to form a milk-like substance much used in cooking. Coconuts, while palatable and nutritious in moderate quantities, are somewhat hard to digest, and there is a natural limit of tolerance beyond which the individual does well not to indulge. Census data, probably incomplete, show that approximately 100 million nuts were used for food in 1938. This figure allows an average annual consumption of about 16 nuts per person. In the Southern Luzon Coconut-Abaca Region, where coconuts are the most abundant, the per capita consumption was calculated to be only a little above average, approximately 19 nuts per person.

f. Vegetables. The production of vegetables, other than root crops, is not an important enterprise in most parts of the Philippines. Green and leafy vegetables are grown extensively only in the principal cities and their environs where truck gardening has become profitable. The reported acreage of all types of vegetables including root crops, in 1938, probably did not exceed 5 percent of the total crop acreage; and the area in vegetables excluding tubers is calculated to be 1.1 percent. If adding the 17,608 hectares of corn eaten as roasting ears it is 1.5 percent.

Aside from root crops and corn eaten on the cob, already discussed, the most important vegetables grown were eggplants and tomatoes, each of which were planted on somewhere around 15,000 acres. These were followed in importance by watermelons, onions, squash, cabbage, ampalaya and radishes. Small acreages of other vegetables were also planted, such as ginger, garlic, chile pepper, mustard, pepper, cucumber, cantaloupes, and various other vegetables common to the Philippines (Table 15).*

It is not correct to conclude, however, that the consumption of vegetable types of food was confined entirely to what was produced by the acreage reported in these crops. In all parts of the Philippines, the leaves, stalks and fruits of a large number of wild and cultivated plants are gathered and cooked with the food, to serve as vegetables in the diet. These include "kalamongay," a leaf having a pungent taste often cooked with fish; wild payayas; sweet potato leave and tips; "pako," an edible fern; "cankong," which appears as a weed in the rice fields; palm hearts; "anti," a garden weed; wild pepper fruits and leaves; banana blossoms; and many others.

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* Detailed information about vegetable types and the area planted in 1938, by provinces and municipalities, is given in volumes II and III, Census of the Philippines: 1939.

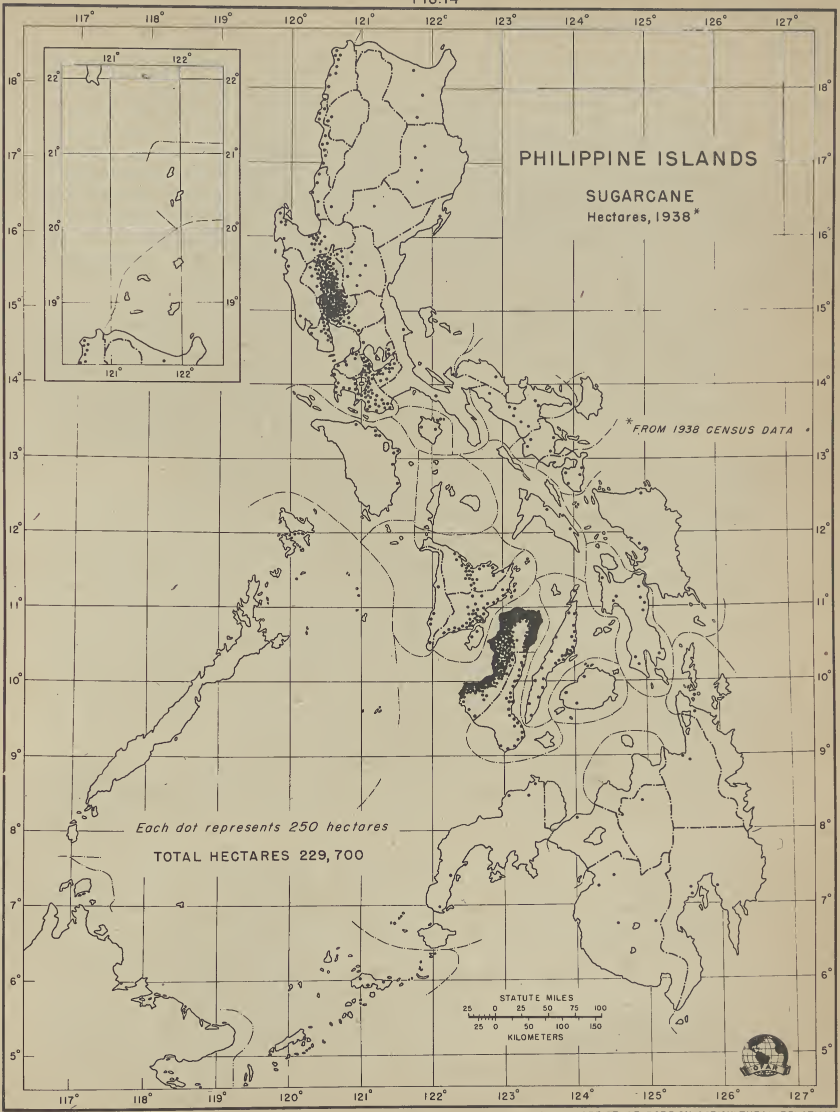
For use in the larger cities, largely by non-Filipinos, a considerable quantity of certain types of vegetables was imported. The largest quantities were of onions, Irish potatoes, garlic and cabbage (Table 39, appendix). In order to meet the deficit of onions, there was undertaken in the 1938-1939 season a program to plant a large acreage in the Philippines, particularly of the Yellow Burmuda type. Nueva Ecija, Luzon, was chosen as the site for the major part of the production.

5. Commercial Crops. By commercial crops there is meant those crops that are grown mainly for sale. The most important ones are sugarcane, coconuts, abaca, and tobacco. Others are maguey, kapok, ramie, cotton, coffee, rubber, and derris root. Together they occupy between 40 and 45 percent of the cultivated acreage; and they are important to many phases of the Islands' economy, including manufacturing, export and governmental revenue. Consequently, they have generally received more attention than was given to the subsistence crops.

a. Sugarcane. Although coconuts occupy a greater acreage, sugarcane is the most important of the commercial crops from the point of view of total economic significance. It has been estimated that, before the war, approximately 2,000,000 persons were dependent for their livelihood upon the sugar industry, and that P 450,000,000 were invested in it. Over the 5-year period, 1935-1939, the value of the sugar exported was 43.3 percent of the value of all products exported. Sugarcane also contributed roughly 40 percent of the total revenue of the government. The Philippines has been one of the major cane sugar-producing countries of the world, following in importance India, Cuba, Java, and Taiwan, and its supply, following liberation, might help substantially to ease the sugar shortage of the United Nations.

Acreage and Production. Sugarcane in the Philippines is used for the manufacture of low grades of sugar, like muscavado and panocha, and for other products consumed locally, as well as for the manufacture of centrifugal sugar. Therefore, some acreage

FIG. 14



U. S. DEPARTMENT OF AGRICULTURE

NEG. 400 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

of cane was found in every province. The most important part, however, was in two regions where the main commercial sugar industry was located, on the islands of Luzon and Negros. About 40 percent of the entire sugarcane acreage in 1938 was on Luzon, mainly in the provinces of Tarlac, Pampanga, Batangas, Laguna, Pangasinan, and Bataan. Approximately 45 percent was on the Island of Negros, mainly in Occidental Negros. The acreage in all other provinces combined was only 15 percent of the total acreage, which, in 1938, was found by the census to be 229,699 hectares (567,586 acres) (Table 22 and Figure 14).

Estimates of sugarcane production are shown in table 24. While acreage has not increased over the period 1921-1939, production of sugarcane has risen very materially, mainly resulting from the use of better varieties, better cultural practices, and more fertilizers, which have brought about considerably higher average yields. Figures of production of sugar and other products of sugarcane are presented in a following section. (Page 57)

Growing Sugarcane. The Philippine sugar farm typically is small sized, often also producing other crops, like rice. Well over half the farms of the main sugar producing regions have 4 acres or less of sugarcane per farm. This small area per farm is particularly characteristic of sugarcane production on Luzon. In Occidental Negros there are 400 or more sugar haciendas upon which the average amount of land cultivated varies from 250 acres to as high as 625 acres. Under this hacienda system, the owner or his manager employs the necessary laborers, who work for a wage in small groups under the supervision of foremen. During the busy season an average of 100 to 250 men is employed. About one-fourth of these laborers reside permanently on the plantation; about three-fourths of them, usually under a verbal contract, are brought from the Island of Panay and the Bantayan Islands during the milling season. The laborers ordinarily live in villages grouped about the owner's house, the permanent laborers living in houses and the non-permanent ones often living in barrack-like structures.

Sugarcane thrives best on sandy loam soil which is not submerged in water during the rainy season; so upland sites for its cultivation are chosen. In preparing the ground for planting, large haciendas often use tractors and heavy plows which plow deeply. Otherwise the land is prepared largely by the use of carabaos and native implements. Planting in the large producing areas usually is begun in October or November and mostly is finished by the end of January. Ratooning, the raising of additional crops from shoots which spring from roots of the first planting, also is practiced, though more so on Negros than on Luzon.

Table 22.-PRINCIPAL COMMERCIAL CROPS: Total acreage, by provinces and regions, 1938 1/

Region	Coconuts		Abaca		Sugarcane		Tobacco	
	Hectares	Percent of Total	Hectares	Percent of Total	Hectares	Percent of Total	Hectares	Percent of Total
Luzon: Ilocos-Mountain Region	3,479	.3	1	2/	6,582	2.9	6,396	11.1
Abra	81		.2		394		599	
Ilocos Norte	684		-		2,101		1,456	
Ilocos Sur	716		-		2,590		749	
La Union	1,606		3/		1,161		3,367	
Mountain Province	392		-		336		225	
Luzon: Cagayan Valley Region	4,268	.4	7	2/	2,040	.9	28,950	50.0
Cagayan	2,849		5		761		10,342	
Isabela	1,113		1		909		18,152	
Nueva Vizcaya	306		1		370		456	
Central Luzon-Zambales	13,960	1.3	3	2/	59,443	25.9	5,609	9.7
Bataan	108		1		3,360		4	
Bulacan	111		-		1,525		215	
Nueva Ecija	175		-		2,210		1,599	
Pampanga	11		-		28,256		41	
Pangasinan	10,977		-		5,059		3,416	
Rizal	382		2		305		41	
Tarlac	775		-		18,295		257	
Zambales	1,421		-		433		36	
Manila City	-		-		-		.1	
Southern Luzon, Rice-Coconut Region	223,425	21.3	198	.1	19,351	8.4	860	1.5
Batangas	17,210		11		10,227		348	
Cavite	7,109		36		1,424		316	
Laguna	49,864		18		6,873		32	
Tayabas	149,242		133		827		164	
Southern Luzon, Coconut-Abaca Region	161,230	15.3	125,993	43.2	4,143	1.8	143	.3
Albay	50,565		49,730		1,020		48	
Camarines Norte	22,939		4,833		217		6	
Camarines Sur	44,235		26,500		1,951		82	
Sorsogon	43,491		44,930		955		7	
Panay	41,661	4.0	2,769	1.0	16,143	7.0	2,268	3.9
Antique	6,203		368		1,282		272	
Capiz	19,064		2,037		5,167		123	
Iloilo	16,394		364		9,694		1,873	
Negros	36,916	3.5	2,105	.7	103,426	45.0	2,745	4.7
Occidental	12,244		210		97,281		912	
Oriental	24,672		1,895		6,145		1,833	
Mindoro	18,000	1.7	1,499	.5	1,939	.8	63	.1
Romblon	24,689	2.4	149	.1	45	2/	153	.3
Cebu	39,127	3.7	746	.3	7,052	3.1	3,544	6.1
Bohol	32,954	3.1	562	.2	684	.3	360	.6
Samar	75,927	7.2	14,082	4.8	423	.2	654	1.1
Palawan	9,687	.9	3	2/	112	.1	59	.1
Sulu	19,460	1.9	5,273	1.8	715	.3	246	.4
Batanes	151	2/	1	2/	73	2/	11	2/
Masbate	35,095	3.3	621	.2	404	.2	1,395	2.4
Marinduque	20,477	2.0	1,120	.4	410	.2	81	.1
Leyte	63,651	6.1	21,134	7.2	2,473	1.1	1,564	2.7
Mindanao	227,060	21.6	115,265	39.5	4,241	1.8	2,823	4.9
Agusan	11,258		6,856		452		282	
Bukidnon	312		4,745		177		66	
Cotabato	16,318		4,485		996		430	
Davao	37,500		81,820		602		511	
Lanao	10,634		938		290		354	
Occidental Misamis	27,443		376		110		183	
Oriental Misamis	38,068		4,187		99		247	
Surigao	34,285		9,391		260		158	
Zamboanga	51,242		2,467		1,255		592	
TOTAL	1,051,217	100.0	291,531	100.0	229,699	100.0	57,924	100.0

1/ Compiled from data in Census of the Philippines, 1939, vol. II.
2/ Less than .05 percent.
3/ Less than .05 hectares.

Table 23.- PRINCIPAL COMMERCIAL CROPS: Production, by regions and provinces, 1938, 1/

Regions	Sugar						Coconuts		Abaca		Tobacco	
	Centrifugal sugar (Metric tons)	Percent of total	Muscovado (Metric tons)	Panocha (Metric tons)	Basi (1,000 Liters)	Molasses (1,000 Liters)	Number of nuts (1,000 nuts)	Percent of total	Metric tons	Percent of total	Metric tons	Percent of total
Luzon: Ilocos-Mountain Region	3,601	.4	1,863	5,802	4,559	1,535	3,285	.1	.8	2/	3,447	10.7
Abra	-		37	328	299	76	38		.1		307	
Ilocos Norte	-		-	1,144	2,444	545	278		-		801	
Ilocos Sur	3,550		430	1,997	964	834	676		-		422	
La Union	51		1,396	2,206	435	33	1,959		.7		1,784	
Mountain Province	-		-	127	417	47	334		-		133	
Luzon: Cagayan Valley Region	-	-	61	763	813	148	3,561	.2	4	2/	17,173	53.5
Cagayan	-	-	-	302	321	89	3,076		3		5,010	
Isabela	-		61	327	339	52	400		.3		11,943	
Nueva Vizcaya			-	134	153	7	85		.3		220	
Central Luzon-Zambales	232,227	24.3	4,358	6,744	544	51,615	26,533	1.2	.6	2/	3,218	10.0
Bataan	14,384		149	4	-	1,894	90		.2		2	
Bulacan	1,688		484	-	-	377	83		-		130	
Manila City	-		-	-	-	-	-		-		3/	
Nueva Ecija	2,793		553	2,536	142	789	80		-		814	
Pampanga	121,759		-	500	-	27,129	5		-		24	
Pangasinan	6,949		2,182	1,044	287	3,133	23,823		-		2,116	
Rizal	108		804	124	-	31	202		.4		18	
Tarlac	84,546		173	2,033	60	18,261	704		-		114	
Zambales	-		13	503	55	1	1,546		-		20	
Southern Luzon Rice-Coconut Region	80,263	8.4	3,869	3,426	21	15,825	720,257	31.3	36	2/	290	.9
Batangas	44,462		2,116	679	15	5,676	42,425		3		124	
Cavite	2,464		1,174	1,307	-	205	9,684		5		105	
Laguna	33,337		579	92	-	9,915	185,806		1		15	
Tayabas	-		-	1,348	6	29	482,342		27		46	
Southern Luzon Coconut-Abaca Region	-	-	-	5,939	44	8	297,272	12.9	32,801	22.8	50	.2
Albay	-		-	941	15	8	92,497		14,368		27	
Camarines Norte	-		-	135	11	-	48,292		956		.9	
Camarines Sur	-		-	1,435	18	-	59,129		4,802		21	
Sorsogon	-		-	3,428	-	-	97,354		12,675		1	
Panay	46,648	4.9	6,099	1,408	-	13,313	47,304	2.1	856	.6	1,282	4.0
Antique	-		3,066	-	-	-	6,544		83		124	
Capiz	15,373		509	1,181	-	4,173	21,472		652		55	
Iloilo	31,275		2,524	227	-	9,140	19,288		121		6,103	
Negros	564.237	59.0	2,453	-	-	99,058	83,069	3.6	1,268	.9	1,546	4.8
Occidental	521,056		-	-	-	90,863	20,339		57		475	
Oriental	43,181		2,453	-	-	8,195	62,730		1,211		1,071	
Mindoro	6,958	.7	34	23	-	1,621	36,840	1.6	466	.3	21	.1
Romblon	-	-	13	11	-	-	48,341	2.1	35	2/	79	.2
Cebu	13,852	1.4	4,178	15	-	3,967	79,023	3.4	363	.3	1,970	6.1
Bohol	-	-	339	1,221	-	6	57,997	2.5	209	.1	164	.5
Samar	-	-	-	725	-	-	150,247	6.5	7,329	5.1	264	.8
Palawan	-	-	-	31	-	15	20,895	.9	.2	2/	32	.1
Sulu	-	-	-	350	-	16	38,020	1.7	5,783	4.0	144	.5
Batanes	-	-	-	9	47	1	298	2/	.2	2/	5	2/
Masbate	-	-	-	206	-	-	51,363	2.2	210	.1	835	2.6
Marinduque	-	-	-	718	-	-	39,662	1.7	173	.1	16	.1
Leyte	8,969	.9	609	2,338	-	1,899	98,746	4.3	11,648	8.1	606	1.9
Mindanao	-	-	661	1,021	92	70	500,365	21.7	82,947	57.6	972	3.0
Agusan	-		47	84	38	36	28,539		3,130		73	
Bukidnon	-		-	11	-	6	202		1,479		21	
Cotabato	-		98	250	-	2	19,625		1,692		169	
Davao	-		17	89	17	4	66,099		68,151		124	
Lanao	-		245	8	-	6	15,913		386		112	
Occidental Misamis	-		16	4	-	-	78,918		167		84	
Oriental Misamis	-		37	3	-	-	113,472		1,862		80	
Surigao	-		-	375	37	-	69,894		4,997		62	
Zamboanga	-		201	197	-	16	107,653		1,083		247	
Total	956,755	100.0	24,537	30,750	6,120	189,097	2,303,078	100.0	144,130	100.0	32,114	100.0

1/ Sugar Statistics compiled from data in Bulletin of Philippine Statistics, vol. 6, 1939.
Others Compiled from data in Census of the Philippines, 1939, vol. II.

2/ Less than .05 percent.

3/ Less than .05 metric tons.

Harvesting is begun in November and is continued through April or May. Cane is cut by the use of the all-important bolo, and leaves are stripped preparatory to hauling to the mills, which usually is done on narrow-gauge temporary railways built for this purpose.

The varieties used are both native and imported. The Bureau of Plant Industry has conducted tests to determine the best varieties for different conditions, and these varieties have been recommended for the farmer's use. The most prominent ones are Luzon White, Cebu Purple, Badilla, P.O.S. 3078, Pampanga Purple, and Maritium 1400. Others, more recently introduced or developed, are rapidly becoming important.

Fertilizers, largely ammonium sulphate, have been used in increasing quantity, normally applied at the rate of about 300 pounds per acre. Experiments have demonstrated that applications of phosphate and potash also would increase yields, and a large proportion of the quantity of these fertilizers imported have been applied to sugarcane.

Mosiac, Fiji disease and sugarcane smut are reported to be destructive, although there appears to be a marked difference among varieties in resistance to mosiac. Of the insect pests, the cane borer and the white grub are serious menaces on some plantations.

Milling. Sugarcane is processed in sugar centrals, which convert the cane into marketable products. Contracts between growers and centrals are often drawn for a period of 30 years. Growers agree to plant a certain number of acres and to have their cane milled through the contracting central, and the mill owners agree to furnish transportation for the cane and to convert the cane into sugar. As a rule the mills themselves engage only to a very limited extent in agricultural operations, although they encourage the planting of better varieties and the more extensive use of fertilizers. The cane is not purchased outright by the centrals, who do the grinding almost entirely on a custom's basis. For their services, the centrals are given a share of the sugar produced, usually 40 to 50 percent, and the planter receives the balance of 50 to 60 percent. The grower ordinarily sells his sugar directly or through a cooperative association, but he occasionally has the mill act as his selling agency.

Forty-five centrals were listed in 1941. Of these, 16 were on Luzon, 18 on Negros, 6 on Panay, 2 on Cebu, 2 on Leyte, and 1 on Mindoro. The names, locations, and capacities of these plants are shown in table 38 , (Appendix,pp.122-3). The sugar which they manufacture is centrifugal sugar, and the by-products are chiefly molasses and bagasse, the latter being the fiber residue which remains from the cane stalks and which is used largely as fuel. In at least one large central (Bais), bagasse was turned into paper. Equipment for the conversion of molasses into alcohol is installed in some of the plants. Under Japanese occupation, special encouragement was given to the production of alcohol for motor fuel.

In addition to the centrals there are a large number of small mills, which are found in practically all provinces and which produce crude forms of sugar largely for domestic consumption. These forms are muscovado, which is a dark colored crystalline form of sugar, and panocha, which is a crude dark-colored sugar usually molded into solid cakes. Cane also is used locally for the production of basi, a popular native alcoholic beverage, and stalks in the fresh state are chewed.

Sugar Production. The total production of sugar, during the decade 1930-1939, averaged annually womewhat above 1,000,000 short tons (approximately 1,000,000 metric tons). Well over 90 percent of this was centrifugal sugar; a little more than half of the remainder was muscovado. This is about double the amount of sugar produced around 1921. Although production reached a peak of 1,652,000 short tons in 1933, it was reduced to about 1,000,000 tons in the late 1930's by the marketing quotas set under the United States Sugar and the Independence Acts. Between 1921 and 1930 there was a large reduction in the proportion of muscovado sugar, which represented about 30 percent of the total around 1921 (Table 24). The production of panocha and basi, about 35,000 short tons and 1,500,000 gallons, respectively, has remained roughly constant.

The production of these products, for the year ending June 30, 1938, is shown by regions and provinces in table 23. The production of centrifugal sugar on the whole island of Luzon was 316,091 metric tons, while that of Negros was 564,237 metric tons. Panay, with 46,648 metric tons, was the third largest producer. There followed Cebu with 13,852, Leyte with 8,969, and Mindoro with 6,958 metric tons. A certain amount of either muscovado or panocha sugar was produced in practically every province. In general, a high proportion of the panocha was produced on Luzon, while Luzon, Panay, and Cebu accounted for most of the muscovado. Little sugar of any kind was produced on Mindanao. About 98 percent of all the basi was produced on the Island of Luzon, with 40 percent made in the one province of Ilocos Norte.

Table 24.- SUGAR: Sugarcane and Sugar production, 1921-40

Crop Year 1/	Sugarcane harvested			Sugar produced				Basi	Molasses
	Acreage cultivated	Calculated yield per acre 2/	Calculated production of all cane harvested 3/	Total	Centrifugal	Muscovado	Panocha		
	Acres	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 gal.	1,000 gal.
1921	595,066	10	5,884	533	219	283	31	2,784	5,597
1922	561,642	8	4,536	475	259	191	26	1,990	2,609
1923	561,395	9	5,062	529	325	172	32	1,025	786
1924	591,740	13	7,766	780	552	192	36	1,140	1,277
1925	572,886	10	5,765	607	408	164	36	1,136	1,568
1926	586,501	12	7,143	767	587	141	39	1,074	1,153
1927	585,636	13	7,544	808	635	129	44	1,437	2,959
1928	636,801	14	8,767	934	769	122	43	1,621	5,405
1929	640,063	14	8,721	984	867	77	40	1,628	6,674
1930	633,021	14	8,895	958	871	51	36	1,762	11,816
1931	625,435	17	10,696	1,174	1,100	42	32	1,652	11,407
1932	663,365	18	12,170	1,343	1,285	29	28	1,994	25,371
1933	755,854	20	15,035	1,653	1,598	23	31	1,814	68,164
1934	521,603	13	6,699	755	700	26	29	1,671	52,992
1935	619,603	14	8,833	1,043	979	28	35	2,057	46,738
1936	635,195	16	10,351	1,186	1,118	31	37	2,332	52,834
1937	563,215	18	10,050	1,116	1,055	27	34	1,617	49,954
1938	567,584	17	9,918	1,149	1,089	27	33	2,122	28,285
1939	589,951	17	10,011	1,142	1,049	64	29	1,793	50,578
1940 4/	-	-	-	1,148	1,035	-	-	-	-
1941 4/	-	-	-	1,167	-	-	-	-	-

Source: Bureau of Agricultural Economics, United States Department of Agriculture. The World Sugar Situation , September 1943. Compiled from reports of Philippine Department of Agriculture and Commerce.

1/ Harvesting begins about November 1, the length of the growing season being about 11 months.

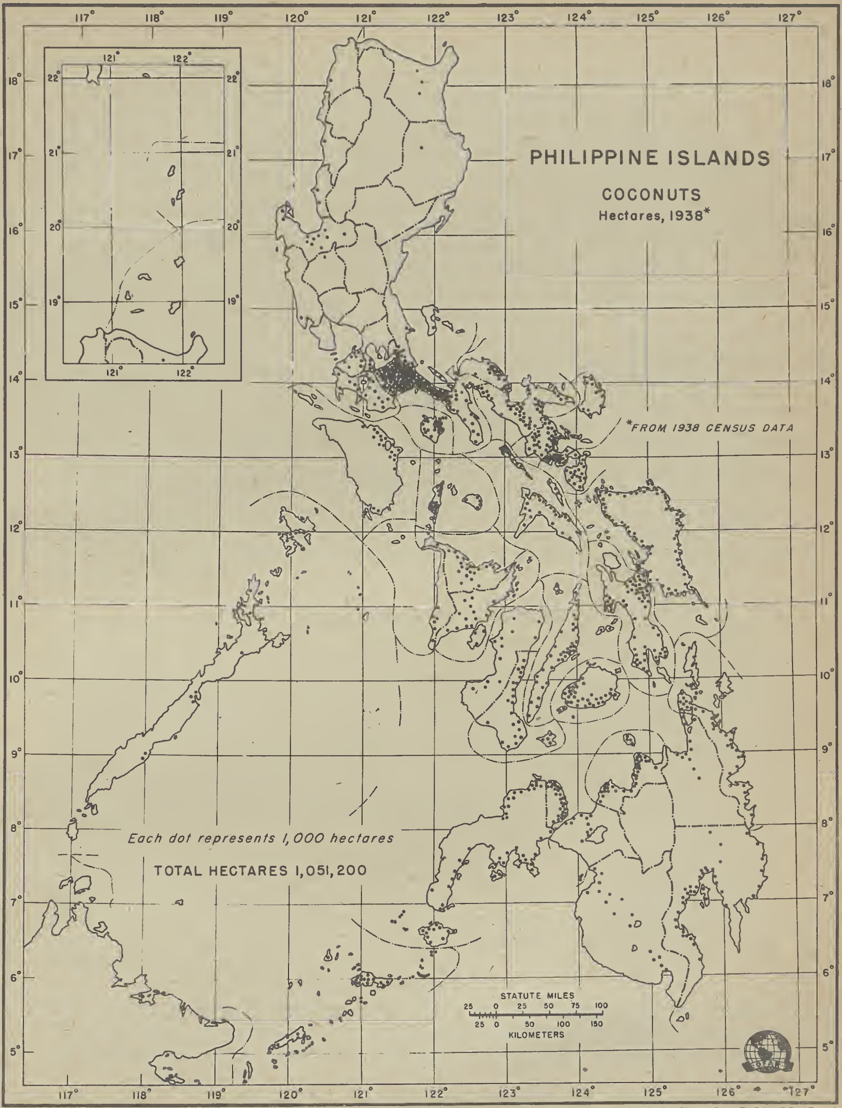
2/ Calculated cane production divided by acreage.

3/ Calculated cane production is the sum of the estimated quantities of cane used for the production of the various kinds of sugar and basi. The quantity of cane ground for the production of centrifugal sugar is estimated on the basis of the reported yield of sugar per ton of cane. The quantity of cane ground for the production of muscovado, panocha and basi is estimated on the basis of assumed ratios of juice extraction between the small mills and centrals.

4/ Preliminary.

Note: $\frac{\text{Short Tons}}{1.1023}$ = Metric Tons. RESTRICTED

FIG. 15



PHILIPPINE ISLANDS

COCONUTS

Hectares, 1938*

*FROM 1938 CENSUS DATA

Each dot represents 1,000 hectares

TOTAL HECTARES 1,051,200

U.S. DEPARTMENT OF AGRICULTURE

NEG. 407 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

b. Coconuts. The coconut has been used as a food crop on the Pacific islands for centuries, but it became important as a commercial crop only after it began to constitute an important source of vegetable oil. In the Philippines, coconuts occupy more cultivated land than any other crop except rice. The size of this industry is also indicated in the fact that about 4,000,000 people are estimated to have been wholly or partially dependent upon it and that more than P 300,000,000 were invested in it before the war. The government revenues obtained from the coconut industry have been about 10 percent of total receipts, and the average value of the coconut products exported, for the five-year period 1935-1939, made up 28.9 percent of the value of all products exported.

The Philippines lead all countries in the quantity of coconut products exported, and its export of copra and oil accounted for about one-third of the tropical fats exported from all of the southwest Pacific and southeastern Asia. A considerable contribution could be made to the war effort by arranging, as soon after liberation as possible, for the exportation of the largest quantities possible of copra or coconut oil, in order to relieve the shortage of fats and oils which now exists among the United Nations. It is reported that the 1945 supply of these commodities is below that of the previous year, while the demand has increased greatly since the liberation of parts of Europe.

Acreage and Production. While coconuts can be grown under many different conditions of rainfall, they are not as well adapted to regions that have long dry seasons or to regions that have damaging winds. Most of the important regions of coconut production, therefore, are located where there is a good supply of moisture throughout the year and where typhoons do not strike with damaging force. These conditions exist on southern Luzon and the islands southward, where most of the coconuts are grown.

Estimates for acreage vary greatly, as one might expect from the way a large part of the coconuts are planted. For the year 1939, the census recorded a total of 1,051,217 hectares of coconuts. Over a third of this acreage was located on southern Luzon. The next largest acreage was on the Island of Mindanao, which had 21.6 percent of the total. Other important coconut producing provinces were Samar, Leyte, Panay, Cebu, Negros, Masbate, and Bohol (Table 22 and Figure 15).

Production is given in terms of nuts, of which it was reported that a total of around 2.3 billion were harvested in 1938. About 30 percent of these came from the three provinces of Batangas, Laguna and Tayabas; and southern Luzon as a whole supplied approximately 44 percent of the total production of coconuts. Mindanao was the next largest producer, and large quantities came also from Samar, Leyte and Panay (Table 23). Figures for the production of copra and other products are presented in a following section.

Coconut Cultivation. Some of the more recent plantings of coconuts have been made on well arranged plantations, but a larger proportion of the trees are found on scattered pieces of land. The most productive soils for coconuts are deep alluvial or volcanic loams and sands. The coconut tree can tolerate water around its roots if the water is moving, but it can not survive if the water is stagnant. Clay land which is water-retaining is considered very unsuitable. Often the coconut grows in almost pure sand on beaches, where there is a subterranean supply of water moving seaward that provides nutrients.

Where rainfall is well distributed,planting may be done at any time of the year, preferably during the months of least rainfall. Where there are wet and dry seasons, the plants best are set in the field during the early part of the rainy season. The plant is propagated only from whole nuts, which wisely are selected from highly productive trees. For planting, they generally are germinated in nursery seedbeds, and then transplanted into the field at the age of 8 to 12 months. On good, fertile soil trees may reach bearing age after 5 to 6 years; on poorer land they do not reach that stage until after 8 to 10 years.

Ripe nuts usually are cut from the tree by the use of a hooked knife fastened to the end of a long bamboo pole. The nuts also are gathered by expert climbers; and sometimes they simply are allowed to fall.

A number of important insect pests affect the coconut. One of the most destructive is known as "uang" (Oryctes rhinoceros), which bores into the trunk of the coconut tree. The second is the palm weevil, (Rhynochophorous ferrugineus olive), which damages the tree by boring into the crown. Occasionally there are serious outbreaks of the leaf miner and the locust. Bud rot is considered the most serious disease of the coconut. This attacks the soft young tissue at the apex of the stem, and sooner or later kills the tree through killing its sole growing point.

Minor Uses of the Coconut. Among the minor uses of the coconut is a local use of the nut as a source of food, which already has been referred to, and which has been estimated to utilize about 4 per cent of the total production of nuts. Another local use of the coconut tree is in the production of tuba, widely used as a fermented drink, which is made from the juice of the coconut trees tapped from the flowering stalk. Trees tapped for tuba, therefore, do not produce coconuts while being tapped. A relatively small number of trees is used for this purpose, the total number reported in 1939 being less than 1 percent of the number of trees in bearing. The fresh coconut is also used for the extraction of homemade oil.

Another minor use of the coconut, though more important than uses already mentioned, is the making of dessicated coconut, mainly for export. Well over half of this product was produced in Laguna Province, the next largest center of production being Tayabas Province, both on Luzon. Smaller quantities came from the provinces of Zamboanga and Davao, Mindanao. It is estimated that approximately 7 percent of all the coconuts grown were used for this purpose.

Copra Production. Approximately 89 percent of the coconuts harvested in 1938 were made into copra, dried coconut meat. In preparation for drying, the husk of the coconut is generally although not always first removed, with the use of a native plowshare firmly set in a wooden tripod. The nuts then are cut into nearly equal halves with a sharp bolo, and partially dried in order to loosen the meat from the shell.

Full drying is effected in several different ways. The highest grade of copra is produced in modern drying plants, where the drying is handled scientifically. These drying plants have been established almost exclusively by the larger plantation companies, in the provinces of Albay, Oriental Negros and Mindanao. Their output, in 1938, accounted for only about 1 percent of the copra produced.

Nearly 29 percent of the copra was dried in the sun. To dry by this method the meats, removed from the shell, most commonly are spread upon matting in the open or on rocks or hard ground. Sometimes they are put into trays or on meshed wire and placed in the sun until finally dried. Provision usually has to be made to put the drying coconut under cover in case of rain. The product varies considerably, depending upon the care that has been exercised, but good sun-dried copra is light in color and is considered a superior grade of copra.

The rest of the copra, about 70 percent, is smoked copra. This is made in driers, commonly referred to as Tapahan Driers, which consist essentially of a firepit overlaid with a latticed grid upon which the copra is placed. Where possible, the pits are dug in the side of a hill. Sometimes the heat and smoke are lead off through flues over which the copra is dried. Both smoke and heat pass up through the grid and consequently the finished product is usually rather dark in color.

The production of copra is confined mostly to those provinces where coconuts are produced more abundantly. Where the trees are few, the coconuts are more generally used for local purposes. According to official figures, the average amount of copra produced annually during the 5-year period of 1934-1938 was 592,989 metric tons, which agrees rather closely with independent estimates based upon the exportation of copra and the production of oil. Of the copra reported, approximately 43 percent was produced on Luzon, mainly in southern Luzon; about 20 percent was produced on Mindanao; and a large part of the rest came from Cebu, Negros, Samar, Leyte, and Panay (Table 25).

Copra Marketing. Small planters usually put their copra into sacks and sell it to local middlemen who sell to or are agents for the larger dealers, and who maintain purchasing stations in all producing areas. In small villages these middlemen, usually Chinese merchants, also handle supplies of consumer goods which they sell to the planters. In larger towns, they act merely as agents for the purchase of copra.

The copra purchased in these collection centers is shipped in sacks to the provincial collection centers, where it is classified into intermediate grades by the next buyer. From there, a large part of it, still in sacks, is taken by truck, rail or ship to one of the two main centers of copra use and export, Manila and Cebu. In general, the product of southern Luzon was shipped by truck and rail to Manila; and the copra manufactured at the more distant points on the outer edges of the islands was also taken to Manila in larger ships. The copra of the islands surrounding the Visayan Sea was shipped on small inter-island boats largely to Cebu. Although Manila was the more important collection center, less copra was exported from there than from Cebu, because a major part of Manila's copra was used for the extraction of oil. Some oil also was extracted at Cebu, but roughly 40 percent of all copra exported formerly went from that port. Besides Manila, other ports from which copra was exported were Legaspi, Zamboanga, Dumaguete and Tobaco. When outbound, for export, copra was usually shipped in bulk.

One of the most important elements determining the grade of copra is the percentage of moisture which it contains. A knowledge of how to grade copra for moisture percentage is normally acquired through long practice in handling the product. The tests usually applied are simple ones, like observing the sound when a bag is kicked, or noticing how a piece of copra snaps when bent. Well-dried copra contains between 4½ and 6 percent moisture, but good quality copra arriving at concentration points will often contain from 8 to 12 percent. When the moisture content remains for long above 12 percent, deterioration is likely to be rather rapid. Copra purchased with such high moisture content is usually dried with special means before being placed in storage.

The following are the grades, and their approximate moisture percentages, under which copra was sold in Manila and Cebu:

MANILA

Grade	Percent H_2O	Percent of Shrinkages
Dry	4-1/2	None
Bodega Resecada	5-1/2	1
Resecada	7-1/2	3
Semi-Resecada	12	7-1/2
Buen Corriente	17-1/2	13
Corriente Mejorada		16
Corriente		18-1/2

CEBU

Grade	Percent H_2O	Percent of Shrinkages
Bodega Resecada	4-1/2	None
Resecada	6-1/2	2
Semi-Resecada	9	4-1/2
Buen Corriente	13	8-1/2
Corriente	17	12-1/2
Crude	25	20-1/2

Coconut Oil. Coconut oil is the main product sought for in the coconut. This is obtained by pressing the copra, which yields 60 percent or more of oil by weight. In 1936 there were reported to be eight large modern coconut oil plants operating in the Philippines and supplying oil for export; and there were eleven smaller plants catering mainly to the domestic trade. Most of these plants were located in or near Manila and Cebu. In 1940, 185,902 metric tons of oil were exported, and 59,876 metric tons were consumed

Table 25 .-COCONUTS: Number of trees, and production of copra and homemade oil, by provinces and regions.

Province	Total number of Trees 1/ (June 30, 1939) Thousand	Trees in Bearing 1/ (June 30, 1939) Thousand	Copra 2/ Production (Aver. 1934-38) Metric Tons	Homemade Oil Production 1/ (1938) Liters
Luzon: Ilocos-Mountain Region	466	240	1,027	66,787
Abra	10	5	-	548
Ilocos Norte	86	35	-	11,188
Ilocos Sur	109	65	311	10,276
La Union	212	109	716	34,902
Mountain Province	49	26	-	9,873
Luzon: Cagayan Valley Region	541	286	435	67,972
Cagayan	362	212	435	60,960
Isabela	137	59	-	5,581
Nueva Vizcaya	42	15	-	1,431
Central Luzon-Zambales	2,042	1,312	13,380	310,144
Bataan	17	11	-	330
Bulacan	15	9	-	173
Manila City	-	-	-	-
Nueva Ecija	22	11	-	466
Pampanga	1	1	-	4
Pangasinan	1,642	1,077	10,885	288,390
Rizal	50	20	-	45
Tarlac	107	68	-	12,701
Zambales	188	115	2,495	8,035
Southern-Luzon Rice-Coconut Region	35,916	26,377	186,078	441,387
Batangas	2,652	1,635	4,068	8,924
Cavite	820	504	2,564	11,321
Laguna	7,171	5,699	62,456	74,788
Tayabas	25,273	18,539	116,990	346,354
Southern-Luzon Coconut Abaca Region	19,598	11,579	51,278	686,439
Albay	5,898	3,414	19,871	196,183
Camarines Norte	2,778	1,816	8,289	80,875
Camarines Sur	5,530	3,063	13,052	182,867
Sorsogon	5,392	3,286	10,066	226,514
Panay	5,247	2,830	24,491	103,944
Antique	804	366	3,290	24,171
Capiz	2,378	1,365	12,970	64,818
Iloilo	2,065	1,099	8,231	14,955
Negros	4,928	2,945	29,759	93,076
Occidental	1,712	1,027	8,450	5,425
Oriental	3,216	1,918	21,309	87,651
Mindoro	2,171	1,357	10,879	18,996
Romblon	3,223	2,197	12,314	135,138
Cebu	5,410	3,074	42,815	189,556
Bohol	4,221	2,228	21,293	261,560
Samar	10,200	5,739	28,975	99,331
Palawan	1,204	674	3,797	64,020
Sulu	2,559	1,105	3,437	185,711
Batanes	20	12	-	6,866
Masbate	4,251	2,257	7,680	24,564
Marinduque	2,628	1,668	11,235	70,183
Leyte	8,024	4,519	25,937	77,351
Mindanao	26,560	13,666	118,178	365,179
Agusan	1,350	686	4,176	9,998
Bukidnon	38	11	36	230
Cotabato	1,772	811	2,094	85,404
Davao	4,132	1,801	10,558	14,682
Lanao	1,192	593	2,730	10,263
Occidental Misamis	3,286	1,999	21,911	50,217
Oriental Misamis	4,754	3,080	29,914	36,737
Surigao	4,210	2,002	13,521	36,261
Zamboanga	5,826	2,683	33,238	121,387
Total	139,209	84,065	592,988	3,268,204

1/ Source: Census of the Philippines, 1939. Vol. II.
2/ Sources: Philippine Statistical Review, 1934-1935 and 1936-1937.
Bulletin of Philippine Statistics, 1938-1939.

locally for manufacturing processes. These quantities represent the use of a little more than half of the total amount of copra produced. About 60 percent of the coconut oil exported was shipped from Manila, and the balance was shipped from Cebu.

In addition to this oil made in modern plants, a relatively small amount of home-made oil was produced in every province (Table 25). This usually was made from fresh coconuts, and the greater part of it was used in cooking and for lighting.

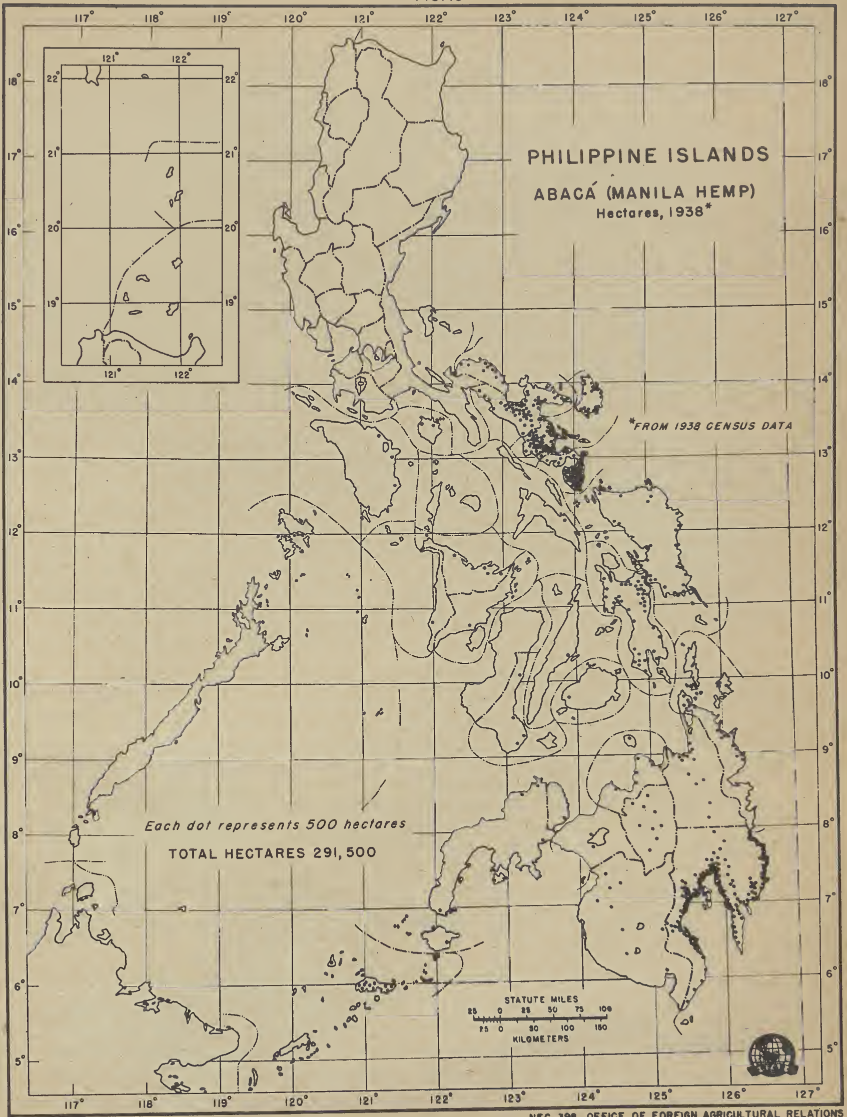
The residue left following the commercial extraction of coconut oil from copra is coconut cake or meal. This is a valuable protein stock feed, which is largely exported for feeding purposes.

c. Abaca. Abaca, also called Manila hemp, is a perennial tree-like plant, growing to as much as 10 to 20 feet high, that resembles the common banana to which it is related. It differs from the banana in having greener and more tapering leaves, darker and more slender stems, and fruits that are sparse and small, full of black seeds, and economically valueless. It is grown entirely for its yield of coarse fiber which is a chief source of material used in making rope. The fiber comes from the leaf sheath borne on stalks or shoots, of which 12 to 20 may spring up from a single rootstock.

Although abaca now has been introduced into a number of other places, it is native to the Philippines, from where a large part of the world's supply still comes. This crop is estimated to occupy 7.4 percent of the total cultivated land of the Philippines, and the value of the abaca fiber and cordage exported, during the period 1935-1939, averaged 13.5 percent of the value of all products exported. In the large producing province of Davao, Mindanao, its cultivation has been largely in the hands of Japanese.

Acreage and Production. The abaca plant grows best near the base of mountain slopes or on rolling hills where soils are well drained and moderately rich. With respect to climate, it is best suited in regions having rainfall throughout the year, but it also is grown to a slight extent where there is a moderate dry season. A high humidity is desirable for the cultivation of abaca and regions having pronounced dry seasons are not conducive to its successful growth. Favorable conditions are represented in southern Luzon, where 43.2 percent of the total acreage was found in 1938, but they are found combined to an unusual degree in Davao Province, Mindanao, which had about 28 percent. Some abaca was grown in other parts of Mindanao, and on islands along the east, particularly on Leyte and Samar. The total acreage was reported to be 291,531 hectares (Table 22 and Figure 16).

FIG. 16



U.S. DEPARTMENT OF AGRICULTURE

NEG. 398 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

The total production of abaca fiber in 1938 was reported to be 144,130 metric tons, of which about 47 percent was produced in Davao Province alone, indicating a yield considerably above the average. Southern Luzon, with 43.2 percent of the acreage, produced only 22.8 percent of the fiber. Leyte and Samar also produced appreciable quantities. In general, production has steadily increased in Davao, while showing a tendency to decline in Luzon (Table 23).

Abaca Cultivation. Not less than thirty-five varieties of this crop are found in the Philippines, but only three are grown on a large scale on Mindanao. The plant can be propagated by seeds, suckers or rootstocks, but suckers are the most satisfactory and the most commonly used. Planting is done at any time during the year in regions where rainfall is adequate; in regions having short dry seasons, it is best done in the early part of the rainy season.

In preparation for planting the land is usually burned, and shoots are set in the field without further cultivation. In the northern provinces the shoots usually are placed at random. In the southern areas, particularly on the plantations of Davao managed by the Japanese, the procedure is similar except that orderly rows are laid out and plants are placed about 10 feet apart in the row. From 2 to 3 years are required for the plant to reach maturity. Maximum yield is obtained when it is 7 to 8 years old; replanting becomes advisable when the plant is from 12 to 15 years old, although it may live up to 20 or 25 years.

Except on a few well-organized plantations, the plant is allowed to mature with practically no care, although more cultivation often would increase the yield. In properly planted plantations, the shading practically eliminates weeds. Just before harvesting, grass is cut around the abaca hills to facilitate cutting the mature stalks. Harvesting properly begins just before or during the time of flowering, and ends with the appearance of the fruit. The stalks are cut with a bolo or a sharp curved knife. After the first harvest, subsequent harvesting is done at short intervals, as the shoots mature.

Labor in the northern provinces is almost entirely Filipino. Around Davao, however, management is almost entirely Japanese, and labor is both Japanese and Filipino.

Extraction of Fiber. In general there are two methods used to extract abaca fiber, of which the first is the native or hand stripping method. Hand stripping is the most common method used in the Philippines, done with the aid of either a serrated or a smooth-edged knife. The latter implement turns out a better fiber, but the former often is preferred by the laborer. On a commercial scale, one harvester to every twelve to fifteen strippers is needed; but on small abaca plantations, the harvester is also the stripper. One stripper by this method can produce only from 8 to 12 kilos of clean fiber a day.

On the larger abaca plantations, small "hagotan" stripping machines, with a capacity of a picul (63.25 kilos) of clean fiber a day, or bigger ones using a 16 or 20-horse-powered engine, and with a capacity of 30 piculs of fiber a day, are used. A large part of the abaca fiber from Davao is cleaned by machine. This method can not produce the very highest grade of fiber, but a large proportion is of medium or better grades, with relatively little classified as poor or waste.

d. Tobacco. Tobacco was introduced into the Philippines from Mexico by Spanish missionaries during the latter part of the sixteenth century. From the beginning it was found that the plant was adapted to the climate and soil conditions of the Philippines, although the crop did not assume commercial importance until later, when the smoking habit was adopted by the Filipinos. Toward the end of the eighteenth century a governmental monopoly covering production, manufacture and sale was established, and lasted for about 100 years. By this time the export of tobacco products had become important. The industry continued to grow after the American occupation, and the United States became the largest foreign consumer of its manufactured products, while Spain continued to be the principal market for Philippine leaf tobacco. France, Korea, Japan, and China also continued to import substantial quantities of leaf tobacco from the Philippines.

While not nearly as important as sugarcane and coconuts, tobacco occupied 1.5 percent of the cultivated land, in 1938, and the value of its export, for the period 1935-1939, averaged 4.9 percent of the value of all products exported.

Acreage and Production. Tobacco grows best under conditions like those which exist in the Cagayan Valley, where soils are deep, porous, fertile and well drained, and where there is a short dry season without a maximum rain period. It also can be grown satisfactorily where there are pronounced wet and dry seasons. Therefore, over 70 percent of all the tobacco in the Philippines is grown in central and northern Luzon, and more than 50 percent of the total acreage is cultivated in the Cagayan Valley Region alone. A large part of the remainder is grown on Cebu, Panay, Negros, and Mindanao (Table 22 and Figure 17).

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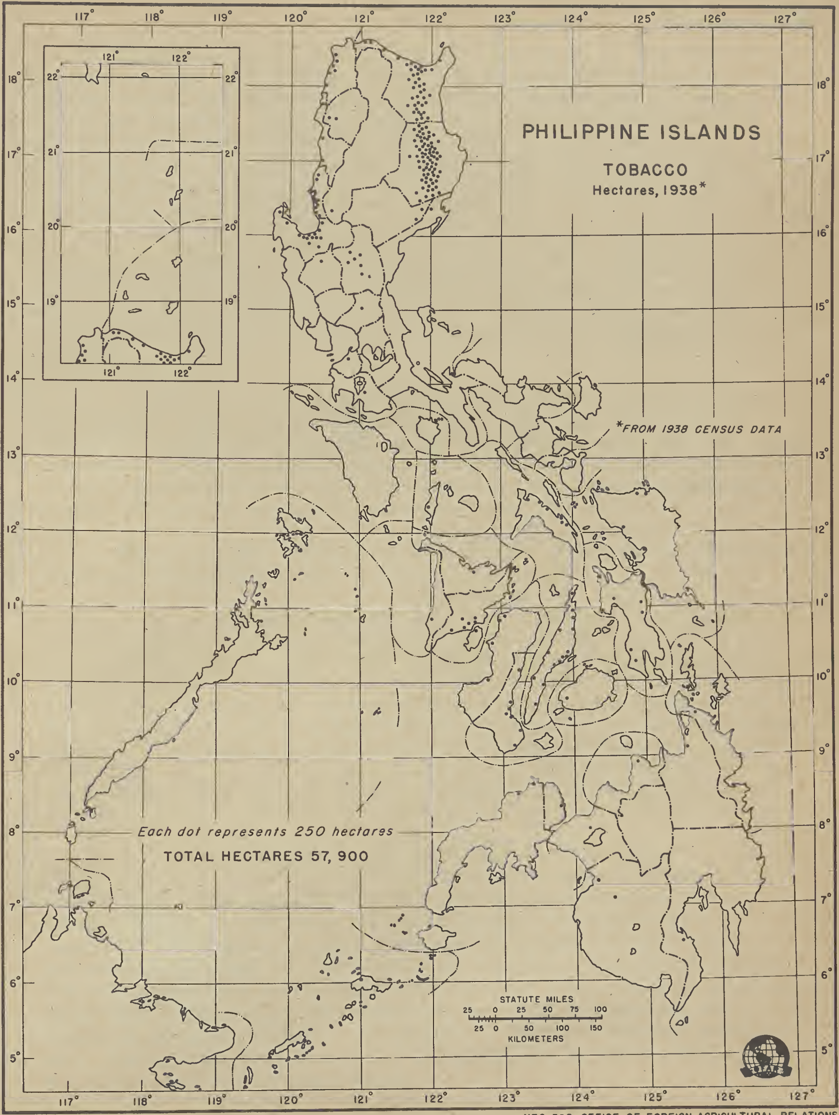
FIG. 17



PHILIPPINE ISLANDS

TOBACCO

Hectares, 1938*

*FROM 1938 CENSUS DATA

Each dot represents 250 hectares

TOTAL HECTARES 57, 900

U. S. DEPARTMENT OF AGRICULTURE

NEG. 399 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

RESTRICTED

The distribution of tobacco production is similar to that of tobacco acreage. About 53.5 percent was produced in the Cagayan Valley Region, and approximately 20 percent was produced in central Luzon and the Ilocos-Mountain Region. The rest was produced mainly on the other islands mentioned. The total production, in 1938, was reported by the census to be 32,114 metric tons (Table 23). Acreage and production between 1931 and 1939, as estimated by the Bureau of Statistics, are shown in table 37 , appendix.

Types and Varieties. Although as many as 60 foreign varieties of tobacco have been introduced into the Philippines, only a few have become commercially valuable. The successful introductions are the Philippine Sumatra, Baker Sumatra, Florida Sumatra, North Carolina, Bright Yellow, Adcock, White Stem Orinoco, Conqueror, Bunat, and Samsoun Bafra.

The Sumatra types were introduced from the Netherlands Indies; the Samsoun Bafra types were introduced from Turkey; and all the others originated in the United States. A number of different standard varieties, having commercial value and differing from each other in one or more characteristics, have developed from these original introductions. All are of the species Nicotiana tabacum.

There are four distinct types of tobacco grown in the Philippines, which are recognized in that market, as follows:

1. *The Cigar Filler Type.* This type of tobacco, used in making the core of the cigar, accounted for more than 90 percent of total production. A number of different standard varieties are used, which are commonly characterized by their rank growth, large to very large stalks and their numerous, large to very large leaves. The best qualities of this type, which are utilized for the manufacture of the more expensive cigars, come from Isabela and Cagayan. The tobacco produced in the other provinces is used for the manufacture of the cheaper cigars, the native-style cigarettes and smoking or pipe tobacco.

2. *The Wrapper Type.* This tobacco, used for cigar wrappers, is the most expensive type of tobacco grown. There are two sub-types, of which the first is the sun-grown wrapper. Sun-grown wrappers are all from Sumatra tobaccos. Their important characteristics are an erect growth, medium height, slender stalks, and moderately erect but thin, ovate or roundish, fine-veined leaves. The second sub-type is the shade-grown wrapper type, which is produced under artificial shade. The varieties for shade culture are the native Simmaba and Vizcaya. The principal wrapper producing provinces are: Isabela and Cagayan for the sun-grown, and La Union, Batangas and Ilocos Sur for the shade-grown.

Tobacco is not grown primarily for cigar binders. In the manufacture of cigars, in the Philippines, binder leaves are selected from either wrapper or filler tobacco according to their suitability for this purpose.

3. The Aromatic Cigarette Type. This type is used in cigarettes, and it includes all the Virginia groups and the Turkish varieties. They are adapted best in places with distinctly wet and dry seasons, such as in the provinces of Central Luzon, and they may be either sun-cured or flue-cured.

4. The Miscellaneous Type. This includes types of tobacco called Batek, Sulcok, Morado, and Catabacuan, that strictly are chewing tobaccos. With the exception of Catabacuan, these tobaccos can be produced from any of the standard cigar filler varieties, which become strong, thick and leathery because of the early topping and overmaturity of the leaves before they are harvested. These suitably are grown only in specific localities, and the production of individual types sometimes are confined to a single municipality.

Tobacco Growing. The tobacco seed first is sown in seedbeds, usually under cover. In the Cagayan Valley seed is sown from August to the end of October; where there is a long dry season, sowing occurs from September through October. Seedlings are transplanted into the field from 45 to 60 days after seed is sown. Topping and suckering are done much as they are done in the United States, but in the Philippines more hand labor is employed in cultivation. With only a few exceptions, the application of fertilizers to tobacco is not generally practiced.

Harvesting starts in February, and usually ends by April or May. Leaves are picked singly as soon as they show the right stage of maturity, successive harvestings being made at intervals of about a week. After having been picked, leaves are piled along the rows and in turn are gathered into baskets and taken to the curing shed.

The production of wrapper leaf tobacco has become a specialized phase of the tobacco industry. It has been found that the most profitable method of producing wrappers of good quality is with the use of artificial shading, which introduces desirable qualities into the wrapping tobacco, and which greatly minimizes, if not fully controls, the fusarium wilt disease. Bamboo poles are used as the frame for the shelter, and coconut and nipa palm leaves and abaca cloth are used for the shade. Shading is begun when the plants are about a foot and a half high, and is continued thereafter.

The most important pests affecting tobacco are worms, which include false budworms, cutworms, and hornworms. Control of worms is attempted by hand-picking and by spraying with calcium or lead arsenate. Grasshoppers are sometimes serious field pests, and cigarette beetles are injurious to cured tobacco unless proper precautions are taken. The chief disease which attacks the shade-grown crop is the green leaf spot. Mosaic, bacterial wilt and fusarium wilt affect the plants grown in open culture.

Curing. The curing process involves both drying and the accomplishment of certain chemical processes that occur after the leaves have been harvested. Curing usually is effected in sheds. For cigar filler types, ordinary farm barns provided with roofs and walls sufficient to protect the tobacco from the rain are used. Leaves brought to the barn are sorted according to size, and are hung upon poles until they are cured. After having been cured, they are taken down and put into piles, known as bulks, where they remain for two months or more. When the rainy season begins the leaves become more pliant, and then they are bundled into hands and bunches. Following this procedure, they again are built into bulks, where they are left until the buying season begins, usually October. Complete fermentation and rigid classification are done by the buying firms.

Similar barns sometimes are used for curing wrapper types, but successful growers construct special curing barns with adequate ventilation systems. After having been sorted for size and soundness, leaves are carefully strung between poles, allowing a small space between each leaf. Curing is done completely by air in a slow gradual manner, over a period of from 24 to 32 days. After curing, the leaves are placed in bundles of convenient size for fermentation, which required from 6 to 8 weeks. The final process on the farm is that of classification and sorting, which is deferred until the cool season begins, when the crop is more pliant. The tobacco is examined leaf by leaf by expert sorters, who place the leaves into different grades. The sorted leaves finally are piled by grade, fan-shaped fashion, and left thus until they are baled.

The aromatic varieties grown from Turkish seed are cured in the sun where conditions are satisfactory, such as in Central Luzon. Varieties of American origin are cured by artificial heat in barns specially constructed for this purpose. The miscellaneous type of tobacco is air-cured in essentially the same manner as the cigar filler type.

e. Maguey. Although sometimes listed as a major crop, maguey (Agava cantala) is not as important as the commercial crops already discussed. It is grown for its yield of fiber, which has many of the same uses as abaca. The plant, itself, however, is a cactus-like plant, quite unlike abaca in appearance. Its climatic and soil requirements are also different from those of abaca. Maguey prospers in sandy or even rocky soils, and it is hardy and drought resistant.

The greatest amount of maguey acreage, therefore, is found in regions having dry seasons. Fifty percent or more of this crop is produced on Cebu. The provinces of Bohol, Pangasinan, Ilocos Norte and Ilocos Sur are other important centers of production. The most reliable estimates of total acreage and production appear to be those of the Division of Statistics, Department of Agriculture and Commerce. According to these estimates, the average area of land devoted to maguey over the period 1934-1938 was 35,374 hectares. Average production was estimated to be 17,950 metric tons (Table appendix). Average exports over the 5-year period 1935-1939 were 11,972 metric tons.

Maguey usually is propagated by suckers, though sometimes by bulbils which grow on a flower stalk. Harvesting starts when the plant is 16 to 20 months old, and ordinarily is done during the dry season, between October and May. Harvesting consists of the removal of the leaves, of which all but 6 or 8 are generally cut off.

The fiber is extracted by retting. Spines at the side and at the tip of the leaves first are removed, and the leaves are split into several parts. They then are soaked in water, preferably salt water, until the pulp partially decays, which happens after 8 to 10 days, during the hot season. The fiber then is washed carefully, dried, and tied into bundles.

f. Cotton. Cotton has been grown in the Philippines since Spanish times, but it never has become a crop of major importance. During the earlier years of the American regime it occupied somewhat more land than it occupies now, but the amount of acreage later declined, and a large part of the requirements for cotton cloth was imported.

Cotton thrives best where there is an abundant supply of moisture during the growing season and a dry period as the crop matures. These conditions prevail more or less in central and northern Luzon and in part of the Misamis Provinces, Mindanao. In 1938, about 30 percent of the area of cotton planted was in Ilocos Norte, and nearly 40 percent was in the Misamis Provinces. Ilocos Sur was the only other producing area of importance, although small quantities of cotton were grown in La Union, Batangas, Abra, Cebu and some other provinces. The total area planted, according to the census, was 1,562 hectares, and the total production was 555 metric tons.

Much interest has been attached to the possibility of increasing the cotton acreage. Under the Japanese occupation, expansion has been seriously attempted, although with uncertain results. Before the war, the general opinion of the Bureau of Plant Industry, Department of Agriculture and Commerce, was that experimental results to that date indicated the possibility that cotton might be a profitable crop to grow in certain sections if suitable provision for its marketing could be arranged. Cotton in many regions incurs the risk of unexpected drought during its growing period. There also are insect problems in its cultivation. The solution of problems connected with the production of cotton would require experimentation and close attention.

g. Kapok. Kapok is a fine fiber used as a filling material for products such as mattresses, pillows, and life preservers. It grows on trees, which begin bearing from two to four years after they have been planted. The tree puts forth showy flowers, from which pods, bearing the fiber, develop. The seeds may be pressed for oil.

The kapok tree is grown successfully in every province of the Philippines. The largest single producer of this fiber is Cebu, which accounted for 35 to 40 percent of the total production. Kapok also is grown to a considerable extent on Negros and Panay, and appreciable quantities are produced in several provinces of central and northern Luzon. The production of this crop has increased much during the past several decades. Estimates of the total production vary greatly, but in 1938 it was probably between 1,500 and 2,500 metric tons. Over the five-year period, 1935-1939, an average of 903 metric tons was exported.

Kapok trees are grown singly or in small groups, mainly in farmyards or along field boundaries. Propagation is by seeds or cuttings. Pods are harvested as they mature, and are opened as soon as possible. Seeds are separated from the floss, mainly with the use of screens. A good tree can produce between 300 and 400 pods.

h. Coffee. Coffee was once a rather important crop in the province of Batangas and, in 1887, ranked fourth in value among all products exported. The industry seriously declined, thereafter, due principally to the devastation created by coffee blight, which was not successfully checked.

Coffee during recent years has been quite a minor crop. Batangas remains the most important coffee producing province, and Cavite and Mountain also have produced it. More recently, coffee growing has been developed on Mindanao, and the provinces of Lanao, Davao and Bukidnon have produced significant quantities. Production in 1938 was between 1,000 and 2,000 metric tons. During the period 1935-1939, average imports of coffee were nearly 4,500 metric tons. Interest in coffee raising, therefore, increased before the war, and it was believed that the coffee industry could be revived through the use of scientific means of combating the blight, at least to the point of caring for domestic requirements.

i. Rubber. Mindanao and some other parts of the Philippines lie in a climatic belt having conditions favorable for the growth of the para rubber tree, and a certain amount of rubber has been produced there for a number of years. So far, however, there has been no important development of this crop. Interest existed in its development, before the war, and plans for resettlement prospects in Mindanao proposed the planting of some 50,000 hectares of rubber. One project, initiated by the National Land Settlement Administration, called for the planting of 1,000 hectares in the Koronadal valley, Cotabato, and the planting of small areas by a large number of settlers. However, not a great deal of progress in this program was made.

Of the total production of rubber, in 1938, about 90 percent came from the one province of Zamboanga. Most of the remainder came from the provinces of Davao and Cotabato. A small quantity of rubber was produced in Mindoro, and an appreciable number of trees, still not bearing, was planted in Albay, Antique, Camarines Sur, Cebu, and Bohol. The total number of bearing trees, in 1938, was reported by the Division of Statistics to be about 600,000, and the average production before the war was reported to be approximately 800 or 900 metric tons.

j. Cacao. The cacao is a small tree which produces large pods containing the beans used in the making of cocoa. So far, its cultivation has been limited entirely to small groups of trees; there have been no attempts to establish big cacao estates. It has been proved that cacao is a profitable crop, however, and it is believed to have possibilities of a considerable expansion.

Some cacao trees were grown in every province, but the largest quantities of the bean were produced in Oriental Negros, Cavite, Bohol, Tayabas, Cebu, Iloilo, La Union and Leyte. The seed pods are harvested at maturity and placed in heaps for a few days, for fermentation. The pods then are opened, and the beans are taken out and placed in boxes, barrels or bins for further fermentation. After this process is completed, the beans are washed slightly, dried, and placed into sacks for storage and marketing.

According to estimates of the Division of Statistics, there were, in 1938, 1,313,930 bearing trees, producing a total of 888 metric tons. This production falls very short of meeting domestic requirements. During the five-year period, 1935-1939, the average annual import of crude and manufactured cocoa was 2,795 metric tons.

k. Derris. Derris is a tropical leguminous plant that is distributed widely in the Philippines. At least 15 species, both indigenous and introduced, are found growing. Its root contains certain toxic substances, which are comparatively harmless to human beings and warm-blooded animals, but which are highly poisonous to many insect pests of farms and households. Therefore, powdered derris root, or the extracted principals (chiefly rotenone), are used in the manufacture of agricultural insecticides. The discovery of its use for these purposes has created a large demand for it in the United States and Europe.

In the Philippines, derris production is managed chiefly by small farmers. Exports of derris are mainly from cultivated plants, though considerable quantities of derris grow wild. The largest derris producing center is Cebu, where about one-half of the total is grown. A relatively large quantity also is produced in Occidental Negros, and important quantities come from Bohol, Surigao, Misamis Occidental and Samar. The total area of derris in 1938 was reported to be about 1,500 hectares, while the total production of dried root was reported to be about 376 metric tons. A large part of the export went to the United States. Some consider that if derris root with a high rotenone content can be developed, a market might be found for the output of a greatly expanded acreage.

l. Lumbang. "Lumbang bato" is a common Philippine name for the tree which is known in Hawaii as the candle nut tree and in India as the Indian walnut or the Belgian walnut tree. This is an important oil-bearing tree of the Philippines. The most important uses of its oil are the manufacture of varnish, the preparation of paints, the manufacture of soap, and illumination. A large part of the production is used domestically for these purposes.

The Lumbang tree seems to grow best in regions having dry seasons. At least half of the production comes from Luzon, mainly from the provinces of Cavite, Batangas, Rizal and Laguna. Cebu and Negros Occidental also are important producing centers. In 1938 the total number of bearing trees was estimated to be 72,000, and the total production about 2,000 metric tons.

The Lumbang tree thrives well up to 2,000 feet of elevation, and it can be grown successfully on dry thin soils unsuitable for general farming. Trees begin bearing when four years of age, and they are in full bearing when fifteen years of age. Flowers are produced in May and June, and fruit is matured ten months later. Nuts are allowed to fall to the ground, and to remain there until the pod has decayed before they are collected. The average production per tree is 8,000 to 10,000 nuts.

Lumbang generally is marketed in the form of kernels, which are extracted in many different ways. A modern plant (Elizalde and Company, Manila), in which the nuts were cracked and the kernels removed by machinery, was in operation before the war.

m. Ramie. Ramie is the source of a fine fiber, which in its raw unprocessed state is known by the trade as China grass. Cloth made from it often is called China linen, Canton linen, or grass linen. The plant belongs to the nettle family, and resembles the nettle in appearance. Its stems, which grow to a height of as much as eight feet, contain a fine lustrous fiber. This fiber is similar to flax, but its strength and elasticity are superior to those of flax. Ramie also is durable, lightweight and resistant to moisture.

Some ramie has been grown in the Philippines for a long time, but its production was particularly stimulated by the demand from Great Britain and the United States when imports from China were reduced after 1937. The increased plantings were made mainly on Mindanao,

Ramie thrives well in regions where rainfall is distributed evenly, but it is stunted where there is dry weather. Being a weed, it will grow in almost any soil, though it grows best in a rich sandy loam. It is propagated by seeds, cuttings or root stocks, the last being preferable. Stalks mature after two to four months, when they are cut close to the ground. Thereafter two to four crops, the first one normally being cut in May, are harvested per year. After stalks are cut the leaves are removed and the bark containing the fiber is stripped. This bark then is submerged in water for several days to ret, and afterwards the bark and the pulp are scraped from the fiber, which then is dried and prepared for market.

6. Animal Husbandry

The production of livestock has been an important enterprise of the Philippine farmers only on a small proportion of the farms. Around centers of large population there were some commercial poultry and dairy farms. There also were farms where cattle raising was a major occupation, in provinces such as Masbate, Bukidnon, Cotabato and Lanao. A considerable number of animals in the Philippines, however, was raised on small farms as a minor adjunct to the production of crops. The important forms of animals raised were carabaos, cattle, swine, chickens and ducks; while less important forms were horses, goats, sheep and turkeys.

a. Work Animals. The most common type of work animal in most regions in the Philippines is the carabao. This animal weighs approximately 1,200 pounds, stands the heat well, and is capable of doing a large amount of work in plowing or in pulling a cart. It enjoys wallowing in water, and is practically the only draft animal used in working paddy fields. The total number of carabaos recorded in the census of 1939 was 2,918,730, of which 2,526,026 were on farms. This includes all ages and breeds, and does not indicate how many were used for work purposes. Although a considerable number of carabaos were found in all parts of the islands, more, relative to the number of farms, were found in the rice and sugar producing regions.

The second most important type of animal used for draft purposes is cattle, which were raised in large numbers in certain parts of the islands. In many places cattle are mainly important as a source of meat. However, in hilly regions and particularly where upland crops are the staples, appreciable numbers also have been used for farm operations. Three main types of native cattle are described, the Batangas type, the Ilocos type and the Masbate type. The Batangas is the largest, well-selected bulls weighing about 750 pounds and cows weighing about 550 pounds. Their prevalent color is yellow and fawn. The Ilocos type is a little smaller, and it has a variety of colors, commonly black with white or yellow spots. The bullocks are gentle and are used in pulling small-sized bull carts ("carretons"). The Masbate and similar types, found widely throughout the Philippines, are the smallest. These animals usually forage for themselves, and they are the cattle used most commonly for meat purposes. The number of cattle was nearly equal to or greater than the number of carabaos on Mindanao, Oriental Negros, Palawan, Sulu, and Masbate (Table 26).

Some horses, mostly pony types, are used in the Philippines. About one-fourth of the total number was found in Central Luzon, where they were used to draw small carriages. They seem also to have been in some numbers in the Southern Luzon Rice-Coconut Region, which had 17.6 percent of the total number of horses (Table 27).

Table 26.-LIVESTOCK: Number of Farms, Work Animals, Carabaos and Cattle, by Provinces and Regions, Census of 1939, 1/

	Farms		Work 1/ Animals on farms		Carabaos				Cattle			
	Number	Percent of total	Number 1/	Percent of Farms Having	On farms All ages and breeds	Not on farms	Total	Percent of total	On farms All ages and breeds	Not on farms	Total	Percent of total
					Number	Number	Number		Number	Number	Number	
Luzon: Ilocos-Mountain Region	133,592	8.2	147,008		189,268	22,889	212,157	7.3	129,074	21,464	150,538	11.2
Abra	13,329		17,219	80.7	29,077	2,421	31,498		18,339	1,686	20,025	
Ilocos Norte	31,234		45,242	88.5	51,029	4,625	55,654		24,385	3,420	27,805	
Ilocos Sur	27,163		32,881	81.6	35,482	6,702	42,184		35,599	10,409	46,008	
La Union	25,739		31,124	77.9	40,294	4,784	45,078		16,047	2,433	18,480	
Mountain Province	36,127		20,542	30.1	33,386	4,357	37,743		34,704	3,516	38,220	
Luzon: Cagayan Valley Region	79,394	4.8	141,317		234,069	29,779	263,848	9.0	52,108	10,197	62,305	4.6
Cagayan	36,561		69,102	90.0	110,687	13,107	123,794		21,785	2,698	24,483	
Isabela	32,719		58,323	93.6	102,429	12,235	114,655		19,490	2,499	21,989	
Nueva Vizcaya	10,114		13,892	87.4	20,962	4,437	25,399		10,833	5,000	15,833	
Central Luzon-Zambales	285,902	17.5	427,902		583,247	72,112	655,359	22.5	81,109	10,830	91,939	6.8
Bataan	6,305		12,614	77.8	18,288	3,942	22,230		498	140	638	
Bulacan	36,014		46,383	81.0	68,680	6,983	75,663		9,067	1,366	10,433	
Manila City	56		48	42.9	124	253	377		41	142	183	
Nueva Ecija	78,319		117,233	88.0	157,799	12,021	169,820		10,684	692	11,376	
Pampanga	23,628		50,529	86.2	63,429	11,902	75,331		1,901	206	2,107	
Pangasinan	86,615		111,737	83.1	138,719	15,385	154,104		39,399	4,983	44,382	
Rizal	14,149		17,435	74.9	29,389	7,519	36,908		7,334	1,361	8,695	
Tarlac	28,651		53,984	90.2	72,794	9,407	82,201		4,502	521	5,023	
Zambales	12,165		17,939	82.5	34,025	4,700	38,725		7,683	1,419	9,102	
Southern Luzon Rice-Coconut Region	151,373	9.3	143,654		145,091	18,522	163,613	5.6	123,614	17,169	140,783	10.4
Batangas	50,316		49,930	72.0	27,329	3,874	31,203		62,512	10,454	72,966	
Cavite	22,463		25,046	73.4	28,578	3,936	32,514		10,976	2,053	13,029	
Laguna	25,720		22,218	51.5	27,810	4,729	32,539		7,043	1,714	8,757	
Tayabas	52,874		46,460	59.4	61,374	5,983	67,357		43,083	2,948	46,031	
Southern Luzon Coconut-Abaca Region	121,782	7.4	112,915		158,981	31,305	190,286	6.5	31,605	4,463	36,068	2.7
Albay	44,261		33,129	40.3	47,635	12,069	59,704		12,267	2,453	14,720	
Camarines Norte	10,011		14,844	59.8	18,896	2,287	21,183		1,538	378	1,916	
Camarines Sur	35,822		44,240	63.3	64,455	12,797	77,252		12,855	1,043	13,898	
Sorsogon	31,688		20,702	36.3	27,995	4,152	32,147		4,945	589	5,534	
Panay	134,104	8.2	199,208		264,106	43,138	307,244	10.5	121,058	23,049	144,107	10.7
Antique	23,662		31,922	78.4	33,905	4,186	38,091		35,546	6,116	41,662	
Capiz	43,527		56,401	71.8	78,781	11,842	90,623		16,291	3,970	20,261	
Iloilo	66,915		110,885	85.3	151,420	27,110	178,530		69,221	12,963	82,184	
Negros	83,336	5.1	110,827		141,369	51,894	193,263	6.6	77,732	20,539	98,271	7.3
Occidental	35,896		70,441	67.7	96,032	46,562	142,594		26,617	12,090	38,707	
Oriental	47,440		40,386	52.9	45,337	5,332	50,669		51,115	8,449	59,564	
Mindoro	16,271	1.0	22,753	72.3	39,455	9,056	48,511	1.7	29,859	6,049	35,908	2.7
Romblon	14,521	.9	12,847	48.9	22,354	2,303	24,657	.9	9,963	435	10,398	.8
Cebu	121,548	7.4	77,568	45.5	88,607	11,038	99,645	3.4	64,503	8,520	73,023	5.4
Bohol	63,388	3.9	59,139	61.8	90,137	6,019	96,156	3.3	36,208	2,811	39,019	2.9
Samar	63,194	3.9	54,166	37.9	67,879	9,153	77,032	2.6	10,728	2,072	12,800	.9
Palawan	11,304	.7	4,967	16.9	12,289	1,955	14,244	.5	33,149	4,899	38,048	2,8
Sulu	20,384	1.2	23,879	64.1	15,798	3,642	19,440	.7	28,064	7,617	35,681	2.6
Batanes	1,724	.1	1,690	61.3	374	30	404	2/	7,572	571	8,143	.6
Masbate	17,723	1.1	21,498	64.3	44,900	5,875	50,775	1.7	71,953	919	72,872	5.4
Marinduque	9,931	.6	8,364	61.5	13,325	1,445	14,770	.5	3,922	268	4,190	.3
Leyte	100,794	6.2	102,914	61.6	139,410	23,988	163,398	5.6	12,281	2,413	14,694	1.1
Mindanao	204,461	12.5	195,772		275,367	48,561	323,928	11.1	243,688	36,789	280,477	20.8
Agusan	12,072		8,813	41.7	13,495	2,033	15,528		1,730	355	2,085	
Bukidnon	6,561		6,918	62.0	11,138	2,348	13,486		58,776	1,322	60,098	
Cotabato	25,018		26,360	60.8	33,498	7,420	40,918		51,745	7,184	58,929	
Davao	26,251		13,327	25.7	17,946	1,679	19,625		15,674	430	16,104	
Lanao	24,529		28,380	61.2	31,847	10,470	42,317		42,583	16,097	58,680	
Occidental Misamis	25,650		27,000	66.7	40,502	5,093	45,595		10,039	1,497	11,536	
Oriental Misamis	22,521		14,337	41.1	22,217	3,383	25,600		20,187	2,394	22,581	
Surigao	28,982		33,114	53.7	43,960	2,868	46,828		1,088	126	1,214	
Zamboanga	32,877		37,523	64.0	60,764	13,267	74,031		41,866	7,384	49,250	
Total	1,634,726	100.0	1,868,388	64.8	2,526,026	392,704	2,918,730	100.0	1,168,190	181,074	1,349,264	100.0

Source: Census of the Philippines, 1939, vol. II.

1/ Not specified as to type

2/ Less than .05 percent.

Table 27.- LIVESTOCK: Number of Hogs, Horses and Goats, by Provinces and Regions, Census of 1939 1/

Province	Hogs				Horses				Goats			
	On Farms All ages and breeds	Not on farms	Total	Percent of Total	On Farms All ages and breeds	Not on farms	Total	Percent of Total	On Farms All ages and breeds	Not on farms	Total	Percent of Total
	Number	Number	Number		Number	Number	Number		Number	Number	Number	
Luzon: Ilocos-Mountain Region	255,477	111,774	367,251	8.4	20,531	4,708	25,239	7.4	43,804	14,085	57,889	14.4
Abra	38,184	9,207	47,391		5,118	395	5,513		3,010	573	3,583	
Ilocos Norte	52,090	22,883	74,973		4,217	887	5,104		5,868	1,874	7,742	
Ilocos Sur	54,059	39,294	93,353		4,467	2,022	6,489		14,728	6,863	21,591	
La Union	38,787	14,144	52,931		3,371	942	4,313		17,477	4,122	21,599	
Mountain Province	72,357	26,246	98,603		3,358	462	3,820		2,721	653	3,374	
Luzon: Cagayan Valley Region	241,267	61,212	302,479	7.0	26,634	5,036	31,670	9.3	4,980	1,892	6,872	1.7
Cagayan	107,077	30,681	137,758		12,513	2,259	14,772		1,750	1,018	2,768	
Isabela	111,503	18,480	129,983		11,809	1,746	13,555		2,612	559	3,171	
Nueva Vizcaya	22,687	12,051	34,738		2,312	1,031	3,343		618	315	933	
Central Luzon-Zambales	532,435	287,715	820,150	18.9	52,957	34,616	87,573	25.7	56,592	17,413	74,005	18.4
Bataan	7,615	8,483	16,098		572	632	1,204		360	153	513	
Bulacan	49,790	34,764	84,554		4,109	2,862	6,971		1,113	692	1,805	
Manila City	205	15,490	15,695		30	8,242	8,272		5	325	330	
Nueva Ecija	150,263	33,342	183,605		13,681	3,064	16,745		16,458	2,756	19,214	
Pampanga	48,754	47,724	96,478		3,711	4,163	7,874		5,128	3,292	8,429	
Pangasinan	170,832	66,663	237,495		18,420	5,007	23,427		23,644	6,082	29,726	
Rizal	20,007	42,488	62,495		2,182	6,766	8,948		640	1,114	1,754	
Tarlac	57,699	28,500	86,199		4,262	2,704	6,966		7,957	2,679	10,636	
Zambales	27,270	10,261	37,531		5,990	1,176	7,166		1,287	320	1,607	
Southern Luzon Rice-Coconut Region	200,926	94,540	295,466	6.8	45,972	13,815	59,787	17.6	6,621	3,499	10,120	2.5
Batangas	92,746	38,332	131,078		20,251	5,402	25,653		3,896	2,334	6,230	
Cavite	30,989	23,964	54,753		8,615	3,064	11,679		296	260	556	
Laguna	26,226	15,931	42,157		5,018	3,111	8,129		858	421	1,279	
Tayabas	50,965	16,513	67,478		12,088	2,238	14,326		1,571	484	2,055	
Southern Luzon Coconut-Abaca Region	180,003	112,587	292,590	6.7	1,415	511	1,926	.6	5,158	1,407	6,585	1.6
Albay	69,251	48,608	117,859		611	182	793		1,796	548	2,344	
Camarines Norte	12,097	6,398	18,495		195	44	239		657	92	749	
Camarines Sur	57,378	35,067	92,445		372	243	615		1,788	431	2,219	
Sorsogon	41,277	22,514	63,791		237	42	279		917	336	1,253	
Panay	144,661	68,472	213,133	4.9	4,537	1,547	6,084	1.8	19,591	6,102	25,693	6.4
Antique	28,416	9,145	37,561		2,016	141	2,157		3,650	645	4,295	
Capiz	44,626	21,936	66,562		862	181	1,043		7,140	2,337	9,477	
Iloilo	71,619	37,391	109,010		1,659	1,225	2,884		8,801	3,120	11,921	
Negros	209,206	124,898	334,104	7.7	15,801	5,580	21,381	6.3	33,347	12,783	46,130	11.5
Occidental	60,044	70,038	130,082		5,200	3,401	8,601		8,280	5,736	14,016	
Oriental	149,162	54,860	204,022		10,601	2,179	12,780		25,067	7,047	32,114	
Mindoro	21,458	11,990	33,448	.8	3,235	1,097	4,332	1.3	1,529	617	2,146	.5
Romblon	9,819	1,890	11,709	.3	3,653	507	4,160	1.2	4,509	584	5,093	1.3
Cebu	301,349	92,573	393,922	9.1	8,456	3,643	12,099	3.5	68,385	12,041	80,426	20.0
Bohol	159,769	32,793	192,562	4.4	5,761	382	6,143	1.8	5,162	669	5,831	1.4
Samar	87,647	38,642	126,289	2.9	1,041	307	1,348	.4	3,634	1,394	5,030	1.3
Palawan	6,421	2,476	8,897	.2	882	99	981	.3	911	112	1,023	.3
Sulu	187	619	806	2/	6,747	1,537	8,284	2.4	4,041	3,121	7,162	1.8
Batanes	4,623	510	5,133	.1	156	16	172	.1	683	154	837	.2
Masbate	30,918	10,645	41,563	.9	6,061	1,171	7,232	2.1	1,849	464	2,313	.6
Marinduque	16,290	5,392	21,682	.5	6,929	1,111	8,040	2.4	509	40	549	.1
Leyte	235,855	106,396	342,251	7.9	9,224	2,475	11,699	3.4	8,190	1,996	10,186	2.5
Mindanao	419,129	125,920	545,049	12.5	30,810	11,477	42,287	12.4	41,609	12,694	54,303	13.5
Agusan	36,377	9,528	45,905		964	136	1,100		2,285	365	2,650	
Bukidnon	9,137	3,615	12,752		3,558	649	4,207		251	47	298	
Cotabato	16,675	3,243	19,918		2,794	2,939	5,733		6,745	2,157	8,902	
Davao	40,007	13,809	53,816		4,253	874	5,127		2,721	466	3,187	
Lanao	23,509	8,607	32,116		4,517	2,429	6,946		5,807	3,380	9,187	
Occidental Misamis	79,356	20,801	100,157		5,099	1,142	6,241		7,259	1,293	8,552	
Oriental Misamis	67,684	28,885	96,569		4,096	1,158	5,254		6,065	1,697	7,762	
Surigao	68,643	14,363	83,006		2,224	346	2,570		1,950	309	2,259	
Zamboanga	77,741	23,069	100,810		3,305	1,804	5,109		8,526	2,980	11,506	
Total	3,057,440	1,291,044	4,348,484	100.0	250,802	89,635	340,437	100.0	311,105	91,068	402,173	100.0

1/ Source: Census of the Philippines, 1939, vol. II.

2/ Less than .05 percent.

Statistics reporting the number of work animals are given without distinction as to the type. According to the census figures there were, in 1938, a total of 1,868,388 work animals on farms. The number of farms that year was 1,634,726. On the average, therefore, it can be calculated that there were available more than one work animal for each farm. However, there were work animals on a large percentage of the farms only in those regions where agriculture was intensive. In the Cagayan Valley, around 90 percent of all farms had work animals. In most of Central Luzon and the Ilocos Provinces, it was between 75 and 90 percent, and in the provinces of Panay between 70 and 85 percent of the farms had work animals. In Central Luzon and the Cagayan Valley, therefore, there must have been available an average of nearly two work animals per farm for farms having.

In Mountain Province, on the other hand, only 30.1 percent of the farms had work animals, and on Palawan it was 16.9 percent. In much of southern Luzon, the Visayan provinces and Mindanao, it was between 45 and 65 percent, reflecting the less intensive type of cultivation that goes with the raising of coconuts, while in the abaca province of Davao it was only 25.7 percent (Table 26).

b. Meat Producing Animals. Carabaos and cattle, already discussed as work animals, also are used as sources of meat. The number of carabaos slaughtered during 1938 was reported to be 130,140 (Table 28), which was 4.5 percent of the total number of carabaos of all ages and breeds reported living January 1, 1939. The number of cattle slaughtered was 168,864, or about 12.5 percent of cattle of all ages and breeds. These percentage figures make clear the greater use of cattle as a source of meat compared with carabaos; although, since carabaos are much larger animals, they probably provided a greater total quantity of meat than cattle provided.

By far the largest number of animals slaughtered was that of swine. Swine were raised in large numbers in practically every province. Of those on farms, in 1938, about 98 percent were of native types. About 1.5 percent were grades, that is, crossbreds between Western types and native breeds; and less than one percent were of other breeds. The total number of swine, in 1938, was found by the census to be 4,348,484, of which nearly a third were raised off the farm. The number slaughtered was 863,030.

The number of swine on farms allows an average of about 1.9 animals per farm. Not all farms had hogs, and the average number per farm reporting was 2.7 animals. Provinces that had a particularly high average number per farm were Abra, Cagayan, Isabela, Oriental Negros, Cebu, Bohol, Leyte, Agusan, Misamis Occidental, Misamis

Table 28.-LIVESTOCK: Number of Animals slaughtered, 1938

Province	Carabaos		Cattle		Hogs		Horses		Goats	
	Number Slaughtered	Per-cent	Number Slaughtered	Per-cent	Number Slaughtered	Per-cent	Number Slaughtered	cent	Number Slaughtered	Per-cent
Luzon: Ilocos-Mountain Region	13,756	10.6	15,068	8.9	85,835	10.0	1,051	24.8	8,535	16.0
Abra	1,827		1,476		4,944		98		290	
Ilocos Norte	2,717		3,835		12,046		458		973	
Ilocos Sur	2,761		4,066		19,811		119		4,100	
La Union	1,777		2,481		9,193		143		2,750	
Mountain Province	4,674		3,210		39,841		233		422	
Luzon: Cagayan Valley Region	8,614	6.6	5,726	3.4	44,126	5.1	99	2.3	2,422	4.5
Cagayan	4,010		2,323		26,815		4		1,507	
Isabela	3,641		2,039		12,319		44		865	
Nueva Vizcaya	963		1,364		4,992		51		56	
Central Luzon-Zambales	47,252	36.3	43,678	25.9	297,789	34.5	1,207	28.5	13,040	24.4
Bataan	348		252		4,127		36		66	
Bulacan	4,200		1,932		17,636		36		727	
Manila City	17,581		29,507		161,075		-		170	
Nueva Ecija	5,375		2,460		19,132		213		4,354	
Pampanga	2,804		725		31,712		223		1,042	
Pangasinan	8,913		3,779		39,400		162		3,869	
Rizal	3,071		2,147		5,635		452		311	
Tarlac	3,168		1,343		15,072		72		2,169	
Zambales	1,792		1,533		4,000		13		332	
Southern Luzon Rice-Coconut Region	6,010	4.6	18,057	10.7	60,754	7.0	420	9.9	1,632	3.1
Batangas	248		5,886		18,471		44		807	
Cavite	558		5,051		12,331		192		163	
Laguna	2,607		2,237		12,237		145		129	
Tayabas	2,597		4,883		16,715		39		533	
Southern Luzon Coconut-Abaca Region	10,443	8.0	4,493	2.6	30,714	3.6	24	.6	1,540	2.9
Albay	3,733		1,856		7,944		7		350	
Camarines Norte	1,549		642		2,858		11		99	
Camarines Sur	4,603		1,670		12,557		6		800	
Sorsogon	558		325		7,355		-		291	
Panay	9,307	7.2	18,233	10.8	54,352	6.3	21	.5	5,256	9.9
Antique	1,773		2,532		5,518		8		1,031	
Capiz	3,738		2,559		15,846		5		1,568	
Iloilo	3,796		13,142		32,988		8		2,657	
Negros	4,627	3.6	13,909	8.2	52,722	6.1	176	4.1	4,221	7.9
Occidental	3,493		7,815		23,704		18		1,298	
Oriental	1,134		6,094		29,018		158		2,923	
Mindoro	191	.1	2,034	1.2	4,836	.6	30	.7	610	1.1
Romblon	276	.2	1,090	.6	7,060	.8	7	.2	508	1.0
Cebu	5,593	4.3	12,623	7.5	76,318	8.8	312	7.4	7,005	13.1
Bohol	4,215	3.2	4,331	2.6	22,824	2.6	48	1.1	1,042	2.0
Samar	3,858	3.0	2,503	1.5	19,173	2.2	4	0.1	2,098	3.9
Palawan	242	.2	1,372	.8	4,708	.6	7	.2	143	.3
Sulu	290	.2	2,270	1,3	759	.1	-	-	174	.3
Batanes	10	-	1,455	.9	2,123	.2	7	.2	205	.4
Masbate	982	.8	2,523	1.5	4,384	.5	26	.6	230	.4
Marinduque	513	.4	825	.5	1,882	.2	28	.6	18	1/
Leyte	5,587	4.3	3,192	1.9	29,086	3.4	196	4.6	1,315	2.5
Mindanao	8,374	6.4	15,482	9.2	63,585	7.4	576	13.6	3,368	6.3
Agusan	391		211		4,918		42		175	
Bukidnon	115		640		1,475		14		42	
Cotabato	1,490		2,275		2,389		41		609	
Davao	171		1,517		1,311		21		760	
Lanao	595		2,091		1,249		10		350	
Occidental Misamis	1,225		1,951		8,153		52		291	
Oriental Misamis	458		2,931		11,425		160		436	
Surigao	1,972		417		13,913		206		391	
Zambeanga	1,957		3,449		13,752		30		314	
Total	130,140	100.0	168,864	100.0	863,030	100.0	4,239	100.0	53,362	100.0

Source: Bulletin of Philippine Statistics. Vol. 6, No. 4, 1939.

1/ Less than .05 percent.

Oriental, and Surigao, which almost without exception also were large producers of corn (Figure 12), while a great deal of sound grain is not fed to the hogs, weevils and other causes damage large quantities which then are used for feeding purposes.

Goats and sheep were raised for meat in a minor way. Goats are meat animals, usually providing only enough milk for their young. They are small-sized, weighing from 60 to 70 pounds, thick-set, horned, and varied as to color. They are found in hilly country, the larger numbers being found in the Ilocos Provinces, Pangasinan, Oriental Negros, and particularly Cebu (Table 27). A total of 402,173 goats was reported by the census in 1938, and that year 53,362 were slaughtered. The sheep is a small animal with thin legs, white color, and a coarse fleece of poor quality. Only 37,653 sheep were reported in 1938, of which nearly one-fourth was on the island of Negros. Appreciable numbers were found also in the Ilocos Provinces and in Pangasinan.

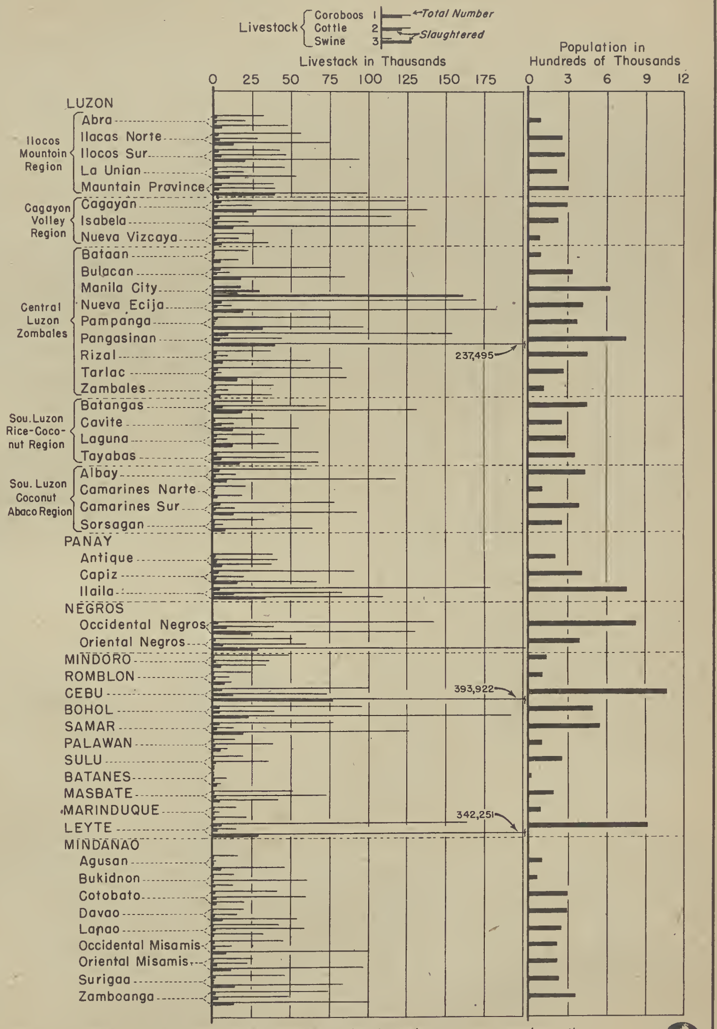
A number of interesting relationships between human population and the numbers of livestock living and slaughtered can be seen by reference to the chart, figure 18. Quite evidently, the number of animals slaughtered in Manila, in relation to the size of the population, was several times higher than in the provinces. A calculation shows that, of all the animals slaughtered in the Philippines in 1938, 19 percent of the swine, 18 percent of the cattle and 14 percent of the carabaos were slaughtered in Manila City alone. This large apparent consumption of meat there is probably due in part to the European population of that city, although urban centers, in general, consume more meat per capita than rural areas. A relatively high consumption in Cebu and Iloilo probably reflects the same influence of urban centers. Average consumption appears to be unusually high in Mountain, Pampanga, and Oriental Negros Provinces, probably as a result of special food customs of their inhabitants.

A noticeably low level of pork consumptioh is seen in the provinces of central Mindanao, and on Masbate, Palawan and Sulu, probably reflecting the influence of the Mohammedan part of the population. It does not appear that this lack is made up by the slaughter of an exceptionally large number of carabaos and cattle; so the consumption of meat in these provinces would seem to be below the average for the islands as a whole.

With respect to the source of animals brought into the large cities, the large number of swine produced on Leyte, in comparison with the size of its population, suggests that this island may have been an important source of pork for the Manila market. Some hogs

FIG. 18

PHILIPPINE ISLANDS: POPULATION IN RELATION TO LIVESTOCK, 1938



Names in capital letters indicate islands. Where island contains two or more provinces, they are indicated below island name in upper and lower case letters.

From the Census of the Philippines, 1938

U.S. DEPARTMENT OF AGRICULTURE NEG. 523 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

may have come to this market, also, from Nueva Ecija, Pangasinan and Batangas. The Cebu market may also have required some from beyond the island of Cebu, which probably were brought in from surrounding provinces. The principal sources of cattle were Masbate, Bukidnon and Cotabato.

Some observers believe that the total farm animal population, especially of swine, goats and poultry, probably was larger than shown by the census, and meat may have played a correspondingly larger part in the farm diet.

c. Poultry. Chickens were reported by the census of 1939 to be present on 85 percent of all farms. The total number reported was about 25 million, of which some 27 percent were not on farms. The number on farms is calculated to have provided an average of about 11.4 per farm. A large proportion of these were raised in small flocks, but a number of semi-commercial poultry farms were reported which produced from 500 to 2,000 eggs daily. Of those on farms, 95.6 percent were of native breeds, 2.4 percent were crossbreds, and 2 percent were of other breeds, largely White Leghorn, Rhode Island Red, Cantonese, and Nagoya. They were raised in every province in large numbers, although the chicken population was a little denser on Mindanao and central and northern Luzon than elsewhere. A large part of their sustenance is picked up in fields and villages, but some corn and broken rice are fed them (Table 29).

Ducks also are a common form of poultry, although they were much less numerous than chickens. The total number reported in 1938 was 690,868. Ducks were particularly common in the rice growing regions, with Central Luzon and the Rice-Coconut Region of Southern Luzon accounting for 62 percent of the total. Geese, with a reported total of 29,573, have a distribution somewhat similar to that of ducks. Turkeys, of which 43,419 were reported, are raised largely in the regions that have pronounced dry seasons, with 55.9 percent found in Central Luzon alone.

Table 29.- LIVESTOCK: Number of chickens, ducks, geese and turkeys, by provinces and regions, census of 1939 1/

Provinces	Chickens				Ducks				Geese				Turkeys			
	On Farms	Not on Farms	Total	Percent of Total	On Farms	Not on Farms	Total	Percent of Total	On Farms	Not on Farms	Total	Percent of Total	On Farms	Not on Farms	Total	Percent of Total
	Number	Number	Number		Number	Number	Number		Number	Number	Number		Number	Number	Number	
Luzon: Ilocos-Mountain Region	1,471,755	,507,359	1,979,114	7.8	38,811	17,479	56,290	8.2	1,141	765	1,906	6.5	1,028	866	1,894	4.4
Abra	126,786	26,208	152,994		1,108	509	1,617		33	19	52		30	16	46	
Ilocos Norte	378,608	111,412	490,020		8,448	6,417	14,865		449	177	626		110	140	250	
Ilocos Sur	293,377	157,016	450,393		2,780	2,311	5,091		176	176	352		253	320	573	
La Union	356,431	103,190	459,845		3,570	1,407	4,977		331	290	621		584	332	916	
Mountain Province	316,329	109,533	425,862		22,905	6,835	29,740		152	103	255		51	58	109	
Luzon: Cagayan Valley Region	1,100,648	234,672	1,335,320	5.3	23,720	7,570	31,290	4.5	1,118	661	1,779	6.0	1,020	660	1,680	3.9
Cagayan	459,331	113,106	572,437		3,999	2,705	6,704		242	228	470		703	435	1,138	
Isabela	529,396	82,593	611,989		15,522	2,930	18,452		651	244	895		276	144	420	
Nueva Vizcaya	111,921	38,973	150,894		4,199	1,935	6,134		225	189	414		41	81	122	
Central Luzon Zambales	4,135,935	1,513,669	5,649,604	22.3	206,410	135,723	342,133	49.5	5,640	5,656	11,296	38.2	14,094	10,191	24,285	55.9
Bataan	55,807	38,977	94,784		418	1,357	1,775		16	100	116		137	152	289	
Bulacan	493,253	225,215	718,518		25,797	9,397	35,194		849	810	1,659		2,958	1,536	4,494	
Manila City	1,961	52,592	54,553		51	6,562	6,613		-	803	803		-	593	593	
Nueva Ecija	1,127,691	178,650	1,306,341		41,122	7,879	49,001		1,817	984	2,801		3,042	841	3,883	
Pampanga	335,309	246,983	582,292		45,779	14,298	60,077		838	384	1,222		3,682	1,904	5,586	
Pangasinan	1,267,745	371,429	1,639,174		28,250	8,401	36,651		1,322	788	2,110		2,259	1,283	3,542	
Rizal	182,074	199,129	381,203		58,174	85,063	143,237		360	1,479	1,839		809	2,648	3,457	
Tarlac	523,369	162,933	686,302		5,611	2,278	7,889		371	276	647		1,060	1,102	2,162	
Zambales	148,726	37,711	186,437		1,208	488	1,696		67	32	99		147	132	279	
Southern Luzon -Rice-Coconut Region	1,406,481	527,281	1,933,762	7.6	34,540	54,076	88,616	12.8	558	1,632	2,190	7.4	2,196	2,139	4,335	10.0
Batangas	582,563	206,083	788,646		5,790	7,147	12,937		133	202	335		120	119	239	
Cavite	197,389	98,955	296,344		2,821	2,436	5,257		75	302	377		130	231	361	
Laguna	190,773	120,810	311,583		23,404	43,420	66,824		211	996	1,207		1,878	1,742	3,620	
Tayabas	435,756	101,433	537,189		2,505	1,073	3,598		139	132	271		68	47	115	
Southern Luzon Coconut-Abaca Region	935,372	430,924	1,366,296	5.4	10,657	4,802	15,459	2.2	1,154	1,235	2,389	8.1	113	128	241	.6
Albay	292,028	163,864	455,892		3,679	1,975	5,654		478	580	1,058		77	100	177	
Camarines Norte	79,515	27,791	107,306		775	322	1,097		18	135	153		-	4	4	
Camarines Sur	388,747	169,465	558,212		2,296	1,340	3,636		446	280	726		29	18	47	
Sorsogon	175,082	69,804	244,886		3,907	1,165	5,072		212	240	452		7	6	13	
Panay	1,633,084	672,327	2,305,411	9.1	54,392	13,363	67,755	9.8	2,058	1,191	3,249	11.0	1,462	924	2,386	5.4
Antique	227,980	69,948	297,928		6,820	528	7,348		85	55	140		35	2	37	
Capiz	562,017	233,247	795,264		30,812	7,950	38,762		942	561	1,503		411	253	664	
Iloilo	843,087	369,132	1,212,219		16,760	4,885	21,645		1,031	575	1,606		1,016	669	1,685	
Negros	1,173,176	838,708	2,011,884	7.9	15,207	6,923	22,130	3.2	1,806	1,070	2,876	9.7	3,016	1,470	4,486	10.3
Occidental	593,700	668,393	1,262,093		11,797	6,114	17,911		1,669	978	2,647		2,774	1,365	4,139	
Oriental	579,476	170,315	749,791		3,410	809	4,219		137	92	229		242	105	347	
Mindoro	162,248	73,117	235,365	.9	1,651	451	2,102	.3	42	49	91	.3	10	21	31	10.1
Romblon	175,621	30,458	206,079	.8	579	171	750	.1	52	43	95	.3	5	12	17	2/
Cebu	1,317,975	348,412	1,666,387	6.6	3,646	2,444	6,090	.9	191	330	521	1.8	1,952	976	2,928	6.7
Bohol	605,669	115,400	721,069	2.9	1,087	345	1,432	.2	106	47	153	.5	37	20	57	.1
Samar	305,916	106,339	412,255	1.6	1,036	675	1,711	.3	53	41	94	.3	7	17	24	.1
Palawan	93,350	40,043	133,393	.5	844	,136	980	.2	109	4	113	.4	55	12	67	.2
Sulu	183,148	67,724	250,872	1.0	2,878	2,837	5,715	.8	15	72	87	.3	27	113	140	.3

(Continued on next page)

Table29 .- LIVESTOCK: Number of chickens, ducks, geese and turkeys, by provinces and regions, census of 1939 1/

(Continued)

Provinces	Chickens				Ducks				Geese				Turkeys			
	On Farms	Not on Farms	Total	Percent of Total	On Farms	Not on Farms	Total	Percent of Total	On Farms	Not on Farms	Total	Percent of Total	On Farms	Not on Farms	Total	Percent of Total
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Batanes	9,778	1,140	10,918	.1	23	4	27	2/	1	-	1	2/	5	-	5	2/
Masbate	181,406	47,500	228,906	.9	1,922	1,459	3,381	.5	154	147	301	1.0	80	83	163	.4
Marinduque	86,577	23,208	109,785	.4	627	189	816	.1	17	18	35	.1	3	-	3	2/
Leyte	968,562	332,193	1,300,755	5.1	1,860	894	2,754	.4	98	161	259	.9	78	95	173	.4
Mindanao	2,607,779	900,148	3,507,927	13.8	29,661	11,776	41,437	6.0	1,109	1,029	2,138	7.2	238	266	504	1.2
Agusan	144,972	30,970	175,942		939	178	1,117		8	15	23		14	-	14	
Bukidnon	72,408	33,180	105,588		1,069	167	1,236		42	7	49		8	2	10	
Cotabato	365,454	234,381	599,835		14,851	4,978	19,829		580	539	1,119		26	25	51	
Davao	350,757	103,255	454,012		2,717	1,023	3,740		121	110	231		26	53	79	
Lanao	319,357	139,910	459,267		4,912	2,800	7,712		64	48	112		10	15	25	
Occidental Misamis	398,817	82,686	481,503		737	442	1,179		29	54	83		38	25	65	
Oriental Misamis	274,944	80,772	355,716		824	375	1,199		61	101	162		41	30	71	
Surigao	212,825	35,639	248,464		876	331	1,207		10	38	48		7	18	25	
Zamboanga	468,245	159,355	627,600		2,736	1,482	4,218		194	117	311		68	98	166	
TOTAL	18,554,480	6,810,622	25,365,102	100.0	429,551	261,317	690,868	100.0	15,422	14,151	29,573	100.0	25,426	17,993	43,419	100.0

1/ Source: Census of the Philippines, 1939. Vol. II .
2/ Under .05 percent.

d. Dairying. Successful dairies were established around the major centers of population, and some milk was produced in rural areas; but dairying has not yet been established widely in the Philippines. To help meet the needs for milk, some 20,000 metric tons of condensed, evaporated, natural and powdered milk were imported annually during the period 1935-1939 (Table 31). Much of this was consumed in cities, but it was used throughout the islands as a food for infants and for the sick, for ice cream, or in coffee.

Early efforts to establish commercial dairies attempted to utilize milk breeds common in the United States, such as the Holstein, Jersey, Guernsey and Ayrshire, which in almost all cases were found to be unadapted to the tropics. Much greater success in the establishment of dairies was obtained when types of milk breeds imported from India were used. The Nellore breed was introduced, and later the Red Sindhi, and use also was made of the Indian buffalo, of which the Murrah breed showed the greatest promise. Some of these were used in crossbreeding, the Sussex-Nellore crossbred showing particular promise. Most of the dairy animals recently in use were purebred animals of these breeds, or crossbreds between them and the local types of cattle.

e. Livestock Diseases and Parasites. Many of the diseases and parasites known in the United States are serious in the Philippines. The most serious animal diseases include rinderpest, anthrax, hemorraghic septicemia, hog cholera, foot-and-mouth disease, contagious pleuro-pneumonia, infectious abortion, glanders, tuberculosis (bovine), hydrophobia, surra, European fowl pest, fowl cholera, and fowl typhoid. Diseases of less importance include epizootic lymphangitis, strangles, tetanus, Texas fever, foot rot, botulism in ducks and blackhead in turkeys. Common parasites include kidney worms (Stephanurus dentatus), widespread among hogs, roundworm of calves, stomach worms of goats and sheep, liver flukes, ticks, scabies, and tapeworms (5).

Attention has been given to the control of these pests. Very successful efforts have been made to control rinderpest, a serious disease among cattle and carabaos. Its incidence has been greatly reduced as a result of a campaign for its control and eradication. Measures at first consisted of rigid quarantine and the Use of anti-rinderpest serum. A practical eradication of the disease was finally made possible through the use of rinderpest vaccine (16).

f. Livestock Improvement. Special consideration to the improvement of different forms of livestock has been given, yet with only moderately successful results due to difficulties inherent in the tropical conditions. These difficulties spring partially from the heat and moisture conditions, but they also arise from the prevalent diseases and other pests, which, in tropical regions, seem to be more virulent in their effect upon Western breeds of livestock than in temperate regions.

Some of the most extensive livestock improvement efforts have been connected with attempts to introduce improved types of dairy animals, already mentioned. Success seems ultimately to have been attained, largely through the use of Indian breeds either as purebreds or crossbreds, which have the necessary adaptability to tropical conditions and diseases. The carabao, as a work animal, seems unsurpassed for the existent conditions, but some attention has been paid to the importation of milk producing buffaloes.

Attention to the improvement of swine goes back several decades. In this effort, specimens of the Black Berkshire, Red Berkshire, Poland China, Duroc Jersey, Chester White and Yorkshire were introduced. The Black Berkshire, Poland China and Duroc Jersey proved to be fairly adaptable to Philippine conditions, and gradually have been distributed for crossbreeding. A crossbred type known as Berkjala, which originated in a cross between the Berkshire and the native Jalajala, appears to combine the hardiness of native swine with some of the desirable pork qualities of the Berkshire. A crossbreed between the Poland China and a local breed known as the Batangas also seems to have promise.

Efforts along similar lines were undertaken with respect to poultry. A number of breeds were imported, of which the following breeds of chickens showed the greatest amount of promise: White Leghorn, Rhode Island Red, Barred Plymouth Rock and Buff Cantonese; Indian Runner and Muscovy Ducks; Bronze turkeys, and some geese and pigeons also were imported. At the same time, a campaign to reduce the number of eggs imported from abroad was inaugurated, with some success. These efforts were in part responsible for the later establishment of the semi-commercial poultry farms.

PART III. AGRICULTURAL FOODSTUFFS

1. The Diet Pattern. A large proportion of the diet in the Philippines typically is made up of cereals, of which rice is the major item. Corn, rather than rice, is the predominant cereal in Cebu, Oriental Negros, Leyte, Masbate, and several provinces of Mindanao.

The second most important type of food in many places is fish. The large amount of coastline that goes with the numerous islands provides an extensive opportunity for fishing. Fish therefore are caught and eaten in large quantity. The amount of meat in the diet is much less than of fish, although eggs are eaten in appreciable quantity. Milk is not used extensively in the average household.

Root crops of one form or another constitute a substantial item in the average diet. In the mountain provinces the sweet potato is a major item, and some sweet potatoes are grown in almost every province. Cassava is also a significant item, particularly in the Sulu archipelago, and gabe (taro), ubi, and tugue (yams) are other root crops eaten commonly.

The quantity of vegetables other than tubers in the average diet is not large, although this seeming lack appears to be made up in some degree by the consumption of edible parts of wild and cultivated plants other than those raised specifically as vegetables (See discussion, page 51).

The main fruit is the banana, of which large quantities, both raw and cooked, are eaten throughout the year. Although a large variety of other fruits are grown, their scattered cultivation and insufficient quantity make them not readily available to the masses of the population at all times. Coconuts, eaten in various forms, have considerable food importance.

It has been estimated that the average per capita consumption of sugar is approximately 20 pounds per person.

2. Diet Composition. The composition of the average diet of working families in the Philippines is suggested by the data in table 30. These data were prepared from sample studies in several different localities and probably are not sufficiently representative to allow too general a conclusion. They confirm that a high proportion of

Table30 .-NUTRITION: Average Composition of the diet of families of Laborers

Location	Average Daily Intake Per Adult Male Unit					Percentage, Distribution of Calories				
	Proteins (gms)	Fats (gms)	Carbo-hydrates (gms)	Salts (gms)	Fuel value (calories)	Cereal Grains (Per-cent	Meat, Fish and Eggs (Percent)	Milk and Dairy Products (Percent)	Fruits and Vegetables (Percent)	Sweet and Fatty Foods (Percent)
Sta. Catalina, a/ Ilocos Sur	60	15	456	24	2193	89.2	5.3	-	4.2	1.3
Paoay, a/ Ilocos Norte	70	25	443	29	2387	78.2	10.9	0.2	8.8	1.9
Pototan, a/ Iloilo	54	13	370	8	1831	90.4	5.9	-	2.6	1.1
Calabanga, b/ Camarines Sur	70	33	564	16	2895	79.4	4.3	0.1	13.3	2.9
Cavite and c/ Nueva Ecija						82.0	10.0		5.0	3.0
Paco, d/ Manila	63	33	377	11	2107	70.9	11.3	0.9	7.0	9.9

a/ Santos, F. O., I. E. Villanueva and F. Silva. Studies of the Plane of Nutrition of Families of Laborers in Sta. Catalina, Ilocos Sur; Paoay, Ilocos Norte; and Pototan, Iloilo. National Research Council of the Philippine Islands. Second annual report, 1935-36. Bulletin No. 11, September 1936.

b/ Santos, F. O.. Studies on the Plane of Nutrition of Laborers in Calabanga, Camarines Sur. The Philippine Agriculturist. vol. 27, No. 9 1939. pp. 755-764

c/ Santos, F. O.. Problems in Filipino Nutrition. Journal Philippine Islands Medical Association, vol. 10, 1930, pp. 121-129.

d/ Gutierrez M. and F. O. Santos. The Food composition of one Hundred Farm Families in Paco District, Manila. The Philippine Journal of Science. vol. 66, no. 4 1938. pp. 397-416.

the diet commonly is made up of cereals; in the regions sampled, between 70 and 90 percent of the calories from all sources came from cereals. The percent coming from proteins, while on the low side, is not strongly so. For a well balanced diet, the percent contributed by fruits, vegetables and fatty foods is quite low, and the amount from milk and dairy products is negligible. It might be expected, therefore, that the intake of calcium and possibly iron would be inadequate.

In terms of the quantity consumed, the average daily intake of 60 to 70 grams of proteins might be considered adequate. Between 30 and 35 percent of this comes from animal sources, however, which usually is considered low. The intake of fats and salts is low; and an average figure of somewhere around 2,200 calories per day for an adult male engaged in active work would appear to be a little on the low side. It is to be kept in mind that these figures are given in terms of an adult male unit, and that they are higher than average figures for an entire family would be.

3. Foodstuffs Imported and Exported. The Philippines before the war was not completely self-sufficient in foodstuffs, particularly in cereals and cereal products. The quantity of rice imported varied a great deal from year to year, depending on local production. Net imports, during the 5-year period 1935-1939, averaged 52,069 metric tons per year. The amount available from imports in 1938 is estimated at 54,865 metric tons (Table 41, footnote 5), which was about 4.4 percent of the total rice available from imports and local production, using the census figures for production. The Philippines, therefore, was between 95 and 96 percent self-sufficient with respect to rice that year. The imports of wheat flour averaged 86,226 metric tons per year during the same period (Table 31). The amount of wheat flour imported increased during this period and reached 102,085 metric tons in 1940. An average of approximately 4,000 metric tons of corn starch were imported annually, although all the corn starch may not have been used for food; and 4,603 metric tons of other cereal products, about one-half being vermicelli and macaroni, were imported annually. These items, taken together, were in sufficient quantity to affect significantly the total supply of foodstuffs available to the country.

A second important group of foodstuffs imported was vegetables and fruits. Fresh vegetables, consisting largely of onions, Irish potatoes and garlic, amounted to a total of 26,236 metric tons. Several thousand metric tons of canned vegetables and an average of 5,900 metric tons of dried beans and peas also were imported. The net import of fresh fruit was 8,838 metric tons, and there was an

Table 31- FOREIGN TRADE: Summary of Imports and Exports of Agricultural Products and Foodstuffs, Average 1935-1939 1/

	Average Imports (M. tons)	Average Exports (M. tons)	Net	
			Imports (M. tons)	Exports (M. tons)
Cereals and Products				
Rice	53,172	1,103	52,069	
Corn	1,322		1,322	
Wheat Flour	86,226		86,226	
Corn Starch	4,002		4,002	
Other Cereals and Products	4,603		4,603	
Meat and Products				
Fresh Meats	1,738		1,738	
Canned Meats	1,899		1,899	
Dried, Smoked, etc.	712		712	
Lard	124		124	
Dairy Products				
Butter	680		680	
Cheese	406		406	
Condensed Milk	5,933		5,933	
Evaporated Milk	13,655		13,655	
Milk Powder	333		333	
Natural Milk	658		658	
Vegetables				
Fresh, green	15,151		15,151	
Fresh, tubers	11,085		11,085	
Canned	2,854		2,854	
Dried Beans and Peas	5,900		5,900	
Dried, Others	280		280	
Starches	1,572		1,572	
Sauces	2,095		2,095	
Fruits and Nuts				
Fresh Fruit	10,146	1,308	8,838	
Dried Fruit	807		807	
Preserved and Canned Fruit (Other than Pineapple)	1,145		1,145	
Pineapple, canned	317	7,811		7,494
Peanuts	1,056	1,178		122
Other Nuts	496	227	269	
Fish				
Fresh	154		154	
Canned	14,075		14,075	
Dried, Smoked, etc.	1,855	558	1,297	
Coconut Products				
Copra	1,146	304,653		303,507
Coconut Oil		163,711		163,711
Edible Coconut Oil		1,212		1,212
Coconuts, Dessicated		36,890		36,890
Copra Meal		112,880		112,880
Tobacco				
Leaf	486	14,253		13,767
Cigars	21 2/	201,980 2/		201,959 2/
Cigarettes	2,712,000 2/	37,348 2/	2,674,652 2/	
Scraps and Cigar Ends		2,692		2,692
Sugar and Products				
Sugar, Total	1,977	806,020		804,043
Molasses and Sirup	77	37,899		37,822
Candies	1,054 3/	47	1,007	
Fibers				
Abaca		167,961		167,961
Canton		3,467		3,467
Maguey		11,972		11,972
Kapok		903		903
Sisal		308 4/		308 4/
Miscellaneous				
Cocoa	2,795		2,795	
Coffee	4,465		4,465	
Tea	241		241	
Oleomargarine	48	2,570		2,522
Vegetable Lard	76	1,884		1,808
Other Vegetable Oils	2,083		2,083	
Salt	6,991		6,991	

1/ Compiled from Data of Annual Report of the Insular Collector of Customs, 1934-36, 1940, and World Foodstuff Study, Department of Commerce, 1942.

2/ 1,000 pieces.

3/ Average 1937-1939

4/ Average 1936-1939

additional 2,000 tons of dried, preserved and canned fruit, other than pineapples. The Philippines was a net exporter of pineapples, the average net export being about 7,500 metric tons. These imported vegetables and fruits were important to the supply of large cities like Manila, but they were unimportant for the country as a whole.

Evaporated, condensed and powdered milk, imported, amounted to an average of approximately 20,000 metric tons annually. In terms of average consumption for the country as a whole, this was not very significant; but the use of these items was widespread and a loss of this supply would be felt. There also were imported annually some 4,000 metric tons of meats, 15,000 metric tons of canned fish, and 1,600,000 dozen fresh chicken and duck eggs (Table 31).

Of the foodstuffs exported, sugar, with an average annual export of about 800,000 metric tons, and dessicated coconut, with an average annual export of about 37,000 metric tons, were the main items. In addition, a total of 4,330 metric tons of oleomargarine and vegetable lard and 1,212 metric tons of edible coconut oil were exported. A stoppage of these exports would not add significantly to the supply of foodstuffs domestically available, since greatly increased quantities of sugar and dessicated coconut probably would not be consumed. More coconuts would be available for food purposes if copra making were decreased, thereby improving the food supply situation in coconut producing regions; although an excessive consumption of coconuts causes intestinal upsets, therefore limiting the quantity of coconuts that can be utilized.

4. Average Pre-war Consumption of Principal Agricultural Foodstuffs.

As would be obvious from the foregoing, any plans for providing an adequate supply of foodstuffs, on the basis of pre-war standards, would have to take into consideration such items as milk, which would have to be imported, and fish. Since fish is not an agricultural item it will not be considered in detail here, but it may well be emphasized that the supply of fish has been greatly reduced since the war, because war conditions made it impossible to carry on fishing as before. This reduction in the fish supply has been particularly serious along the coast of many islands where large quantities of fish are normally eaten. The deficiency, it would appear, can largely be made up upon liberation by giving opportunity to return to the usual forms of fishing and by providing the necessary fishing equipment. At the same time, the supply of vegetables and fruits on a pre-war level can largely be provided through local production and should not require much more attention from the outside than the provision of seed and implements.

There may, however, be a need to provide quite substantial quantities of the basic foodstuffs which, in normal times, were taken care of from the local production of palay, corn, sweet potatoes, cassava, beans, peanuts and minor root crops, augmented by the supply of cereals and cereal products imported. Foodstuffs which might be imported to meet this need could consist of such things as rice, corn or wheat flour; but in estimating requirements for such materials, it would seem that account should be taken of the local production of all the items just enumerated, which were utilized to meet the need for basic starch foods. Attention, therefore, is confined to a study of the supply and consumption of these items.

To represent their local production, census data for 1938 are used; and estimates have been made of the quantities out of those produced which have gone into human consumption. These quantities, in turn, have been reduced to their equivalent in calories, in order to place all items on a comparable basis. A summary of the results of these calculations is shown in table 32, and details, together with an explanation of the methods used in calculating, are given in the different sections and the footnotes to table 41, in the appendix. The total number of calories estimated to have been provided out of the domestic production of these items is 5,777,297 million, of which about 65 percent was supplied by rice, 23 percent by corn, 7 percent by sweet potatoes, 3 percent by cassava, and 1 percent each from legumes and the minor root crops. For the regions individually, of course, the percentage distribution varied greatly from these figures. Actual quantities, in metric tons, may be seen by reference to table 41.

The supplemental quantities, provided through import, also were taken into consideration. Those considered here were rice, wheat flour, corn grain and starch, mungo beans, Irish potatoes, macaroni and vermicelli. The net import of these materials is calculated to have provided approximately 560,675 million calories, or about 9 percent of the total quantity obtained from these groups of foodstuffs (Table 41, footnote 5). Domestic production, according to this estimate, accounted for about 91 percent.

Table 32 .- Foodstuffs: A Summary of the Supply of Cereals, Root Crops and Legumes Estimated Available from Local Production, Compared with Requirements Based on Average Consumption for the Philippines, on a Calory Basis, by Regions, 1938

Region	Rice	Corn	Sweet Potatoes	Cassava	Legumes 1/	Minor Root Crops 2/	Total	Estimated Requirements 3/	Surplus or Deficit	
	Million Cals.	Million Cals.	Million Cals.	Million Cals.	Million Cals.	Million Cals.	Million Cals.	Million Cals.	Million Cals.	Rice Equivalent 5/ (Metric Tons)
Luzon: Ilocos-Mountain Region	241,994	40,726	173,534	2,821	6,562	4,108	469,745	436,211	33,534 +	9,664 +
Luzon: Cagayan Valley Region	260,510	188,331	18,307	1,026	8,259	1,641	478,074	233,908	244,166 +	70,365 +
Central Luzon-Zambales	1,603,744	86,271	12,795	10,271	21,376	3,884	1,738,341	1,343,508	394,833 +	113,785 +
Southern Luzon Rice-Coconut Region	222,493	23,693	2,637	3,251	6,098	2,247	260,419	522,228	261,809 -	75,449 -
Southern Luzon Coconut-Abaca Region	207,857	10,884	19,242	4,366	904	1,801	245,054	461,027	215,973 -	62,240 -
Panay	388,928	38,028	7,540	3,035	6,901	2,742	447,174	534,127	86,953 -	25,059 -
Negros	145,109	150,667	4,999	3,165	1,398	2,362	307,700	482,968	175,268 -	50,510 -
Mindoro	41,480	2,168	423	119	122	154	44,466	52,104	7,638 -	2,201 -
Romblon	9,480	1,333	808	471	69	313	12,474	39,352	26,878 -	7,746 -
Cebu	7,193	152,503	4,141	3,319	1,004	2,165	170,325	422,986	252,661 -	72,813 -
Bohol	63,196	37,755	11,304	2,674	151	2,221	117,301	194,689	77,388 -	22,302 -
Samar	90,546	10,813	28,767	5,696	130	3,527	139,479	216,351	76,872 -	22,153 -
Palawan	9,869	1,053	1,336	1,166	66	261	13,751	37,097	23,346 -	6,728 -
Sulu	36,987	10,836	3,629	112,745	885	286	165,368	97,864	67,504 +	19,453 +
Batanes	135	299	1,143	2	4/	2,017	3,596	3,767	171 -	49 -
Masbate	7,478	18,619	5,710	4,081	208	1,121	37,217	72,268	35,051 -	10,101 -
Marinduque	11,815	500	412	125	80	296	13,228	32,382	19,154 -	5,520 -
Leyte	91,896	169,705	39,381	2,575	651	2,729	306,937	362,701	55,764 -	16,070 -
Mindanao	347,555	373,028	64,399	11,136	2,890	7,640	806,648	790,982	15,666 +	4,515 +
TOTAL	3,788,265	1,317,212	400,507	172,044	57,754	41,515	5,777,297	6,336,520 3/	559,223 - 6/	161,159 -

Source: For details consult table 41 .

1/ Beans of all types and peanuts.

2/ Gabe, ubi, tugue, Irish potatoes and arrowroot.

3/ Average consumption of these groups of commodities, estimated to provide 1085 calories per person per day, multiplied by population according to census of 1939. For derivation of 1085 calories, see Footnote 5, table 41.

4/ Less than .5.

5/ $\frac{\text{Total calories (thousand)}}{3,470}$ = Metric tons of rice.

6/ This figure does not coincide exactly with calories provided by foodstuffs of these categories imported (Footnote 5, Table 41) because calculated on the basis of a round figure of 1085 calories per person per day, omitting decimal places.

The total number of calories, therefore, is 6,337,972 million. On the basis of the population of the Philippines as of January 1, 1939, it is calculated that these would provide an average of 1,085 calories per person per day. For clarity, let it be emphasized that this figure represents only the calories supplied by the stated items (cereals and cereal products, root crops and legumes) and that it is subject to any error there may be in the original production data. Data for the production of rice, for instance, may be too low. An average of the estimates of rice production made for the two years ending June 30, 1938 and June 30, 1939, by the Division of Statistics, Department of Agriculture and Commerce, was approximately 29 percent higher than the census figure for 1938. (See discussion, page 15). If 29 percent were added to the number of calories supplied by rice, an additional 188 calories per day would be provided, which would make a total of 1,273 calories per person per day supplied by these items. For the purposes of all calculations made in this analysis, the original figure of 1,085 calories is adopted.

5. Surpluses and Deficits by Regions. By comparing the total number of calories provided out of the production, of each region, with the number that would be required in that region, on the basis of 1,085 per person per day, it is possible to arrive at an estimate of the extent to which the production of each region was sufficient for its own requirements for basic starch foodstuffs in 1938. The figures arrived at by this method are subject to whatever error there may be in the original production data, as already stated. There also may be a certain amount of error in the inherent assumption that the average quantity consumed in each region was the same as the average for the entire Philippines. Quite clearly these figures would not show what and how much of each item actually was consumed in a given region before the war, because each region had incoming and outgoing food materials. What they are intended to show is the approximate extent to which each region would have been self-sufficient, in these basic items, if it had had available only what was produced locally.

The purpose of such calculations, obviously, is to provide basic information that would be useful in estimating what might have to be added, following liberation, in order to meet a certain determined standard of food consumption. The surpluses or deficits as found in these calculations are themselves not statements of these requirements. Requirements of any region will depend upon the standards of consumption that are adopted, upon the increases or decreases in the production of these crops that may have occurred since 1938, or possibly upon the changes in population which may have occurred. Nevertheless, as basic information to use in calculating requirements, in line with current information, they appear to have value.

According to these calculations, Central Luzon and the Cagayan Valley regions were strongly surplus. The surpluses indicated for Central Luzon and the Cagayan Valley were sufficient to provide, respectively, the equivalents of nearly 114,000 and 70,000 metric tons of rice. Corroborating evidence of a large surplus from the Central Luzon Region is found in the data showing arrivals of rice into Manila from the agricultural portions of this region, in 1940 (Tables 18 and 19). According to these figures, about 100,000 metric tons of rice, apparently milled rice, were brought into Manila City from this area. At the same time, rice probably moved directly from the Central Luzon provinces to the Ilocos provinces, which usually were deficit. There is a possibility, also, that figures showing arrival of rice into Manila are incomplete, since, for instance, more than 20,000 tons of rice were shown to have arrived by truck between August and December, while none whatever was shown for the months January through July. It might be stated with some confidence, therefore, that the producing parts of Central Luzon, in 1940, supplied for use in Manila and other parts of the Philippines not less than 125,000 metric tons of milled rice, and the figure may have been higher. On the basis of the receipt of 100,000 metric tons in Manila as reported, and taking into account the quantities imported from abroad as well as the quantities shipped from Manila to other parts of the Philippines, it is estimated that between 60,000 and 65,000 metric tons of rice were consumed in Manila that year.

It is less certain, however, that the Cagayan Valley ever provided large quantities of rice for use elsewhere. The calculated surplus, it may be pointed out, was dependent on corn and root crops, as well as on rice. Furthermore, although a certain quantity of rice normally was shipped from the port of Aparri to Manila and the Ilocos coast, it appears that these quantities were considerably short of the 70,000 metric tons indicated here as its surplus in 1938. A large surplus of rice in this area, therefore, is hardly to be counted upon.

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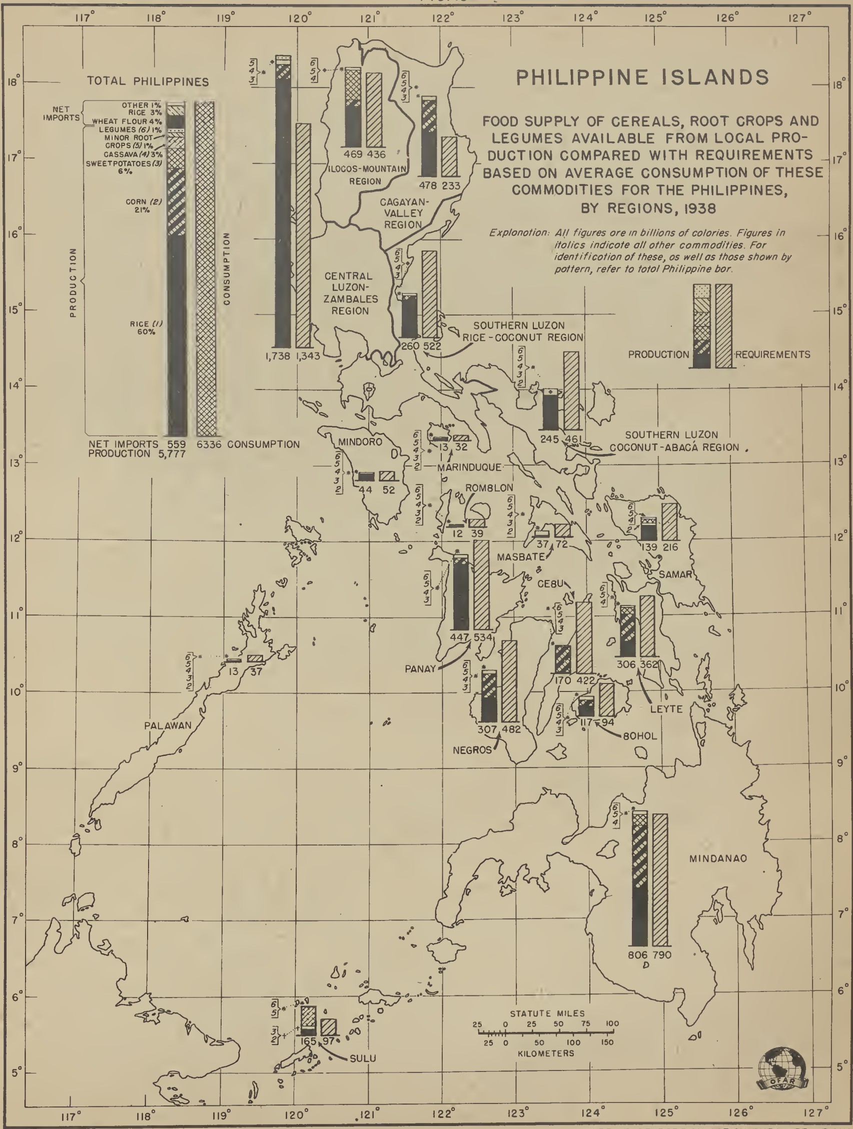
FIG. 19



PHILIPPINE ISLANDS

FOOD SUPPLY OF CEREALS, ROOT CROPS AND LEGUMES AVAILABLE FROM LOCAL PRODUCTION COMPARED WITH REQUIREMENTS BASED ON AVERAGE CONSUMPTION OF THESE COMMODITIES FOR THE PHILIPPINES, BY REGIONS, 1938

Explanation: All figures are in billions of calories. Figures in italics indicate all other commodities. For identification of these, as well as those shown by pattern, refer to total Philippine bar.

U. S. DEPARTMENT OF AGRICULTURE

NEG. 515 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

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Other regions indicated to be surplus are the Ilocos-Mountain Region, Sulu, and Mindanao. The surplus of the Ilocos-Mountain Region is an overall figure for the entire region, which depends a great deal upon the large quantity of sweet potatoes raised in the Mountain Province. Actually, while the Mountain Province is fully self-sufficient or surplus, the Ilocos Provinces are deficit, and under normal conditions required rice from the outside. Likewise, while Mindanao as a whole is shown to be self-sufficient or slightly surplus, the province of Cotabato was the main surplus province. The province of Davao, with over half its cultivated acreage in abaca and with a large area of cultivated land in coconuts, has been strongly deficit. Sulu is shown to be surplus mainly because of its large production of cassava.

Whether a surplus of the stated size, or any surplus at all, will be found in any of these regions after the war will depend upon what has happened in the meantime to production.

All other regions are found to be deficit. Southern Luzon, Samar and Marinduque, where the proportion of land in coconuts or coconuts and abaca is high, were strongly deficit. The same is true of Negros, a sugar producing region; and the production of Cebu and Bohol was considerably short of providing for their dense populations. Until supplies are brought in from the outside, these are the regions which may be expected to suffer the most. The other provinces of the Visayan area, and Palawan, while deficit, are not as strongly deficit; and might be expected more nearly to provide out of local production enough for their needs (Figure 19).

PART IV. SOCIAL CONDITIONS PERTAINING TO PHILIPPINE AGRICULTURE

1. Land Tenure. Although many Filipinos own the land they till, the proportion of non-landowning farmers is rather high in comparison with other countries in Southeastern Asia although it compares favorably with Korea and Formosa. In 1939, only 49.2 percent of all farmers owned the land they cultivated. An additional 15.6 percent owned a part of the land but rented the other part, whereas more than one-third (35.0 percent) of all farmers were tenants.

The various provinces differ widely in the percentage of farms that are operated by their owners. According to the census of 1939 the percentage of farm-operators who were owners of their farms ranged from 12.0 in Pampanga to 95.9 in Palawan. Table 33 shows the percentage distribution of farms in terms of the tenure of the farm operator, by provinces. In general, the higher the density, the degree of economic development, and the prevalence of cash crops -- above all sugar -- the lower the percentage of owner-operated farms, and vice-versa. On the other hand, more than 90 percent of all farms in the Mountain Province and Batanes, as well as in Palawan were managed by owners. In 30 out of the 49 provinces of the Philippines, (excluding the City of Manila) more than 50 percent of all farms were tilled by the ones who owned them. These provinces are found in the northern, northeastern, and southeastern parts of Luzon as well as in the Visayas and Mindanao. The only exceptions in the Visayas and on Mindanao are the provinces of Capiz, Iloilo, Negros Occidental, Cebu, Leyte, and Misamis Occidental.

The area of the holdings of owners operating their own land varies. In general, owner-operated farms of larger size are found in the more recently settled parts and in those areas that still have a great deal of public land.

In 1939, 15.6 percent of all farm-operators were part-owners. They represented an especially large percentage in Abra, Ilocos Norte, Ilocos Sur, La Union, Pangasinan and Cagayan, provinces inhabited either exclusively by Ilocanos or in which Ilocanos form a dominant part of the population. Other provinces where part-owners made up more than one-fifth of all farm-operators were Rizal, Tarlac, Zambales, Batangas, Laguna, Antique, Marinduque, and Bohol. Part-ownership is frequently due to the fact that a farmer owns a number of parcels some of which are located at such a distance that it is more convenient for him to lease his distant parcels and to rent lots near or adjacent to his main field in order to facilitate his farming operations.

Table 33 .- FARM TENURE: Number of Farms and Percent of Farms under Different Categories of Tenure, by provinces, 1939. 1/

	Number of Farms	Owners	Part Owners	Share Tenants	Share cash Tenants	Cash Tenants	Farm Managers
		Percent	Percent	Percent	Percent	Percent	Percent
Luzon: Ilocos-Mountain Region							
Abra	13,329	53.3	35.2	11.1	0.2	0.2	2/
Ilocos Norte	31,234	40.1	40.3	19.3	0.1	0.1	-
Ilocos Sur	27,163	38.9	36.9	23.7	0.4	0.1	2/
La Union	25,739	52.6	29.6	17.3	0.1	0.3	2/
Mountain Province	36,127	95.4	2.7	1.5	2/	0.4	2/
Luzon: Cagayan Valley Region							
Cagayan	36,561	51.2	28.8	19.5	0.3	0.3	2/
Isabela	32,719	51.8	19.1	27.3	0.8	0.9	0.1
Nueva Vizaaya	10,114	55.7	16.3	27.8	2/	0.1	-
Central Luzon-Zambales							
Bataan	6,305	28.7	18.8	35.8	10.2	6.4	0.1
Bulacan	36,014	21.3	14.5	60.5	2.4	1.3	2/
Manila City	56	8.9	-	16.1	10.7	62.5	1.8
Nueva Ecija	78,319	23.1	10.3	64.9	0.4	1.1	0.1
Pampanga	23,628	12.0	17.5	67.9	0.5	2.0	0.1
Pangasinan	86,615	38.6	28.2	30.6	0.8	1.7	2/
Rizal	14,149	36.6	26.7	26.7	2.6	7.3	0.1
Tarlac	28,651	24.8	22.1	51.2	0.3	1.5	0.1
Zambales	12,165	28.8	39.4	20.8	4.4	6.6	2/
Southern Luzon Rice-Coconut Region							
Batangas	50,316	28.9	26.3	44.1	0.6	0.2	2/
Cavite	22,463	27.6	16.8	50.9	1.8	2.8	2/
Laguna	25,720	37.3	22.4	39.0	0.8	0.5	2/
Tayabas	52,874	52.5	11.1	36.2	0.1	2/	0.1
Southern Luzon Coconut-Abaca Region							
Albay	44,261	63.2	13.3	23.2	0.1	0.2	2/
Camarines Norte	10,011	51.3	5.2	43.2	0.3	0.1	2/
Camarines Sur	35,822	51.6	16.0	30.9	0.5	0.9	2/
Sorsogon	31,688	59.0	9.6	30.9	0.3	0.1	0.1
Panay							
Antique	23,662	63.7	21.0	14.8	0.3	0.3	2/
Capiz	43,527	44.0	14.1	37.0	1.0	4.0	0.1
Iloilo	66,915	38.3	14.2	44.8	0.6	2.0	0.1
Negros							
Occidental	35,896	27.1	3.1	65.1	0.9	1.9	2.0
Oriental	47,440	44.0	12.2	43.6	0.1	0.1	0.1
Mindoro	16,271	62.9	9.2	27.3	0.3	0.2	0.1
Romblon	14,521	54.7	9.2	33.8	0.6	1.7	2/
Cebu	121,548	41.5	17.0	41.4	2/	2/	2/
Bohol	63,388	57.2	26.2	16.5	2/	2/	2/
Samar	63,194	77.8	5.5	15.3	0.2	1.2	2/
Palawan	11,304	95.9	0.5	3.3	-	0.2	0.1
Sulu	20,384	73.0	0.5	13.1	1.8	11.5	2/
Batanes	1,724	90.1	8.1	1.8	-	-	-
Masbate	17,723	65.6	3.3	29.2	0.7	0.4	0.7
Marinduque	9,931	57.7	28.7	13.5	0.1	2/	2/
Leyte	100,794	46.7	12.8	40.3	0.1	2/	2/
Mindanao							
Agusan	12,072	78.2	3.2	18.4	-	0.1	0.1
Bukidnon	6,561	64.6	1.1	20.2	0.1	13.0	1.0
Cotabato	25,018	75.4	1.2	21.1	0.4	1.7	0.2
Davao	26,251	72.6	1.0	24.2	1.5	0.5	0.3
Lanao	24,529	68.2	2.9	28.0	0.7	0.2	2/
Occidental Misamis	25,650	46.3	11.5	42.1	0.2	2/	2/
Oriental Misamis	22,521	71.6	6.9	21.2	0.1	0.1	0.1
Surigao	28,982	72.7	13.3	13.7	0.2	0.1	-
Zamboanga	32,877	71.8	2.4	25.3	0.1	0.3	0.1
Total	1,634,726	49.2	15.6	33.5	0.5	1.0	0.1

1/ Source: Census of the Philippines, Vol. II, 1939.

2/ Less than .01 percent.

Share, cash, and share-cash tenants account for 35 percent of all farm-operators in the Philippines. The percentages range from 1.8 in Batanes to 70.4 in Pampanga. Seven of the 49 provinces (excluding the City of Manila) had a tenancy rate exceeding 50 percent; they were Bulacan, Nueva Ecija, Pampanga, Cavite, Tarlac, Bataan, and Laguna, all located in Luzon. Sixteen provinces had a tenancy rate of more than 40 percent, and 25 one of more than 30 percent. There were thus 24 provinces with a tenancy rate below 30 percent. The low incidence of tenancy in La Union (17.7 percent), Ilocos Norte (19.5 percent), and Ilocos Sur (24.0 percent) is remarkable when we consider the fact that these three provinces are among those where the ratio of population to cultivated area is high. Although 35 percent of all farm-operators are tenants they till but 32.4 percent of the land under cultivation. Table 34 shows the percentage of all cultivated land farmed under different types of tenure in 1939. In the five provinces of Pampanga, Nueva Ecija, Bulacan, Tarlac, and Cavite more than half of the cultivated area is tilled by tenants, and more than two-thirds in the first three. In these same five provinces there has been considerable friction in past years between landlords and tenants, which frequently led to violent agrarian unrest.

In 1939, 1,587 farms or 0.1 percent of all farms were operated by farm managers; but these farms accounted for 3.5 of all cultivated land. Approximately one-half of these farms are found in the sugar-producing province of Negros Occidental. In this province farms operated by farm managers include 30.9 percent of all cultivated land. Slightly more than 3 percent of all sugarcane farms and 13.8 percent of all livestock farms were in the hands of farm managers. (Fig. 21)

2. Historical Development of Land Tenure. Present day land tenure conditions in the Philippines reflect the historical past. Some of them are held over from pre-Spanish, or old Malay, times, while others have their roots in the colonial policy of the Spaniards. In pre-Spanish days the peoples of the lowlands and coastal regions were divided into four classes:

a. Chiefs or datos and their families, representing the aristocracy. They owned the land.

b. Free men, who owned land but had to perform such duties as following the dato to war, and helping him with the cultivation of his land and the harvesting of his rice.

c. Serfs, who cultivated land belonging to the dato, to whom they delivered one-half of the crop. This group was obviously what we today would call kasamas, or share tenants.

d. Slaves, who worked in the household rather than in the fields.

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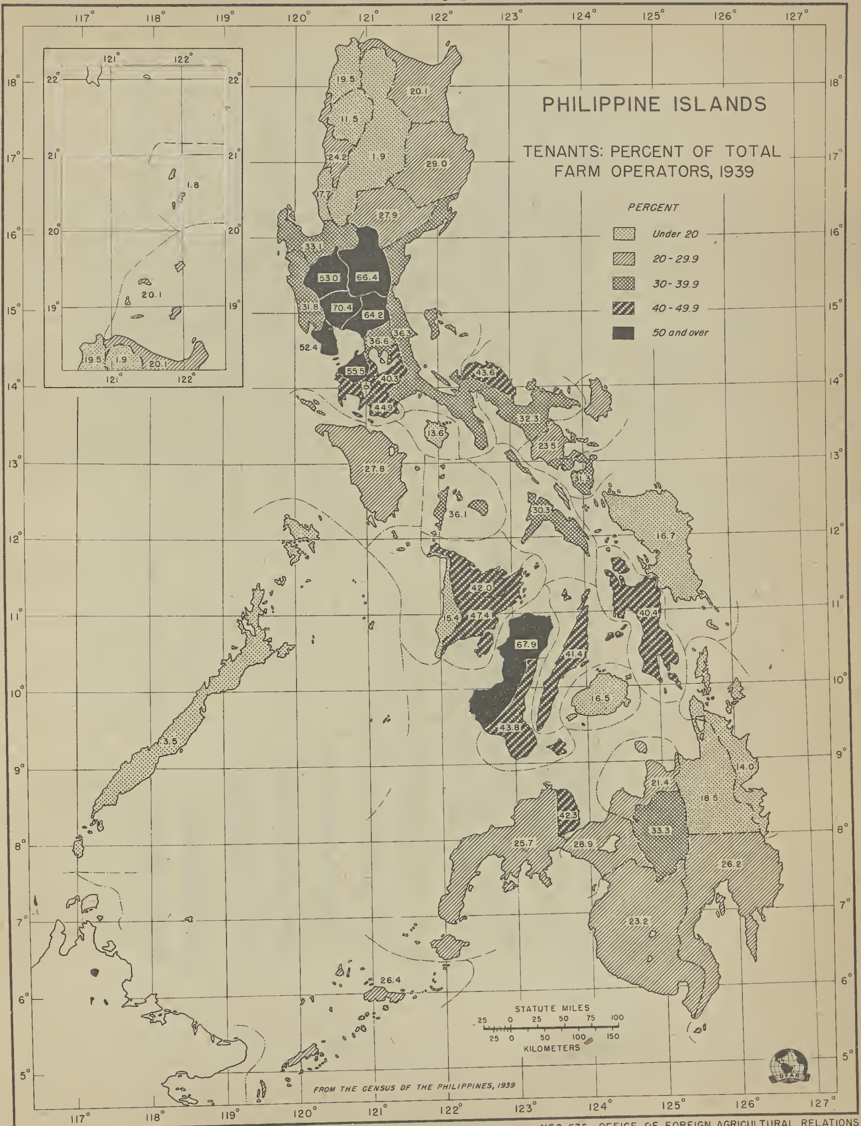
FIG. 20



PHILIPPINE ISLANDS

TENANTS: PERCENT OF TOTAL FARM OPERATORS, 1939

FROM THE CENSUS OF THE PHILIPPINES, 1939

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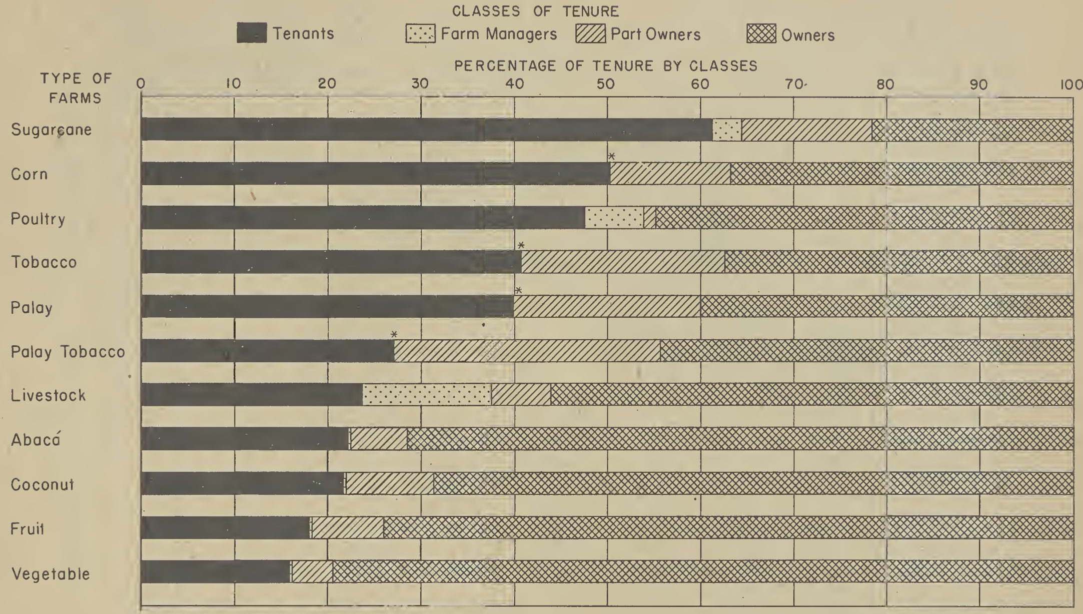
FIG. 21

PHILIPPINE ISLANDS

PERCENTAGE OF FARMS IN EACH TYPE GROUP BY TENURE OF FARM OPERATOR, 1939



Census of the Philippines, 1939

*Less than 0.1%

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Table 34.- Farm Tenure: Percent of All Cultivated Land Farmed under Different Categories of Tenure, by Provinces, 1939 1/

	Owners	Part Owners	Share Tenants	Share-Cash Tenants	Cash Tenants	Farm Managers
	(Percent)	(Percent)	(Percent)	(Percent)	(Percent)	(Percent)
Luzon: Ilocos-Mountain Region						
Abra	50.7	38.2	10.0	0.3	0.2	0.7
Ilocos Norte	37.9	43.1	18.8	0.1	0.1	-
Ilocos Sur	34.4	42.3	22.5	0.4	0.1	0.4
La Union	51.0	32.5	15.6	0.1	0.3	0.4
Mountain Province	94.5	2.9	2.1	2/	0.4	0.1
Luzon: Cagayan Valley Region						
Cagayan	53.4	30.2	15.9	0.2	0.2	2/
Isabela	58.5	17.7	22.1	0.6	0.6	0.4
Nueva Vizcaya	56.3	17.9	25.6	0.1	0.1	-
Central Luzon-Zambales						
Bataan	30.9	19.2	35.1	8.0	3.6	3.3
Bulacan	15.6	17.9	62.2	3.1	1.2	0.1
Manila City	18.6	-	15.0	12.7	52.1	1.5
Nueva Ecija	19.6	11.1	66.3	0.4	1.1	1.4
Pampanga	14.2	17.3	64.6	0.6	1.8	1.5
Pangasinan	33.6	33.0	30.5	1.1	1.8	2/
Rizal	29.7	29.0	28.9	3.3	6.8	2.3
Tarlac	20.0	20.6	50.5	0.3	1.6	7.0
Zambales	24.0	46.5	18.8	4.3	6.1	0.3
Southern Luzon Rice-Coconut Region						
Batangas	23.8	28.0	46.8	0.8	0.2	0.4
Cavite	22.0	18.0	53.5	2.2	2.8	1.5
Laguna	29.3	25.4	43.1	0.9	0.3	1.0
Tayabas	49.6	14.0	35.6	0.1	2/	0.6
Southern Luzon Coconut-Abaca Region						
Albay	58.6	13.4	25.3	0.1	0.1	2.5
Camarines Norte	46.3	6.3	46.5	0.6	0.1	0.3
Camarines Sur	56.2	15.2	24.3	0.4	0.6	3.4
Sorsogon	52.6	11.7	30.6	0.3	2/	4.7
Panay						
Antique	61.7	25.4	12.2	0.4	0.3	0.1
Capiz	44.8	16.3	30.8	0.8	3.5	3.8
Iloilo	38.0	15.8	40.4	0.6	2.8	2.4
Negros						
Occidental	32.1	2.9	28.4	1.2	4.4	30.9
Oriental	49.7	12.8	29.8	0.1	0.2	7.4
Mindoro	63.7	8.6	22.5	0.3	0.4	4.5
Romblon	54.8	1.3	32.0	0.6	1.3	2/
Cebu	46.2	19.8	32.3	0.1	0.3	1.2
Bohol	57.2	27.9	14.8	2/	2/	0.1
Samar	77.8	7.4	14.0	0.3	0.5	2/
Palawan	85.4	1.5	3.6	-	0.2	9.3
Sulu	76.7	0.7	11.7	1.7	9.1	2/
Batanes	90.9	8.0	1.1	-	-	-
Masbate	69.0	4.7	24.2	0.5	0.2	1.4
Marinduque	52.9	35.1	11.8	0.1	2/	2/
Leyte	52.3	14.5	32.8	0.1	2/	0.3
Mindanao						
Agusan	79.7	4.3	14.7	-	2/	1.3
Bukidnon	55.5	1.5	19.2	2/	9.3	14.5
Cotabato	76.5	1.2	13.3	0.3	0.9	7.7
Davao	65.4	1.8	22.0	1.8	0.6	8.4
Lanao	76.6	3.0	18.3	0.6	0.2	1.2
Occidental Misamis	51.7	13.7	34.3	0.2	2/	0.1
Oriental Misamis	72.5	7.9	16.6	0.1	0.1	2.9
Surigao	71.9	15.7	12.2	0.2	0.1	-
Zamboanga	74.1	3.4	18.6	0.1	0.2	3.6
TOTAL	49.0	15.0	30.7	0.6	1.1	3.5

1/ Source: Census of the Philippines, vol. II, 1939.

2/ Less than .05 percent.

When the Spaniards established themselves in the Philippines, they claimed all land for the Crown, but they recognized the rights of the local population to the land which the latter had cleared and was tilling. The Spaniards did not disturb the social structure of the communities or the social and economic positions of the *datos*, whom they called *caciques*. They made use of the *caciques* by incorporating them into their administrative system. By recognizing them the Spaniards helped the *caciques* to preserve their power over the people and gave them the opportunity of acquiring more land, thus making more people dependent upon them.

This group is still of significance today. Being the best educated element in the country it retained leadership after the establishment of American control, and it used its power to monopolize many of the benefits derived from the American regime and to obtain control over local, provincial, and national political life. The *caciques* are in a position to exploit a large part of the rural population, so that the terms *cacique* and *caciquism* as they are used in the Philippines today are rather odious.

The census of 1939 does not show to what extent land is owned by *caciques*, but it is known that a great deal of the rice land of central Luzon, and the sugar, coconut, and abaca land of those provinces which specialize in these crops is owned by *caciques* who divide their estates, or *haciendas*, into small units and lease them to tenants. *Cacique* holdings have been growing in number constantly since Spanish days, and the percentage of tenant farmers has increased correspondingly. This expansion is apparent if we examine the province of Nueva Ecija, which to a great extent was opened up and developed after 1918. In 1935, Nueva Ecija had 15 holdings of more than 1,000 hectares; another 50 had from 500 to 1,000 hectares; about 2,000 holdings had from 24 to 100 hectares. The great majority of the *cacique* holdings comprise less than 100 hectares; only a relatively few exceed 1,000 hectares.

The other institution which developed in the Philippines during the Spanish period is the Church, which in the course of time became an important landowner. Both the secular Church and such religious orders as the Dominicans, Augustinians, and Recollects acquired large areas of the best agricultural land, mainly in the provinces of Cavite, Laguna, Rizal, and Bulacan, that is, in provinces close to Manila. Most of this land was covered by titles issued in the latter part of the 19th century, although a part was covered by titles dating from the 17th and 18th centuries. There have been instances where the claims of the religious orders conflicted with those of the people living on the land, who insisted that they were the true owners.

During the Philippine Revolution against Spain the Malolos Government confiscated all "friar" estates, as the holdings of the religious orders are called. The United States Government was bound, however, by the Treaty of Paris to recognize land titles issued by the Spanish Government and to protect the property interests of the religious orders. Fearing that a reestablishment of the friars' control over their land and tenants would cause agrarian conflicts, the government bought about 410,000 acres of friar land for some $7,000,000 in 1903. The greater part of these friar lands were sold to the tenants. According to the census, Roman Catholic religious organizations still owned 41,782 hectares of land, on December 31, 1938, though the actual figure may have been higher.

The landed estates not owned by the caciques, the secular Church, and the religious orders belong largely to private corporations. In the sugar-producing regions especially, land has been concentrated in the hands of corporations. On December 31, 1938, business corporations owned 346,017 hectares of land; of these 121,096 hectares belonged to Filipino, 106,473 to American, and 70,981 to Spanish corporations. A good deal of this land is worked by cash tenant, the remainder by farm laborers working under estate managers.

In recent years, some of the estates owned by these various groups were the scene of agrarian unrest and conflict between tenants and estate managers.

3. Types of Tenancy. The two main types of tenancy in the Philippines are cash and share-tenancy. The respective Filipino terms are inquilinato and Kasama.

In 1939 the actual number of cash tenants was small (17,111) compared with the number of share tenants (547,953), and only one percent of all farms were operated by them.

The cash-tenancy or inquilinato system is found in all provinces of Luzon and also in some of the other islands. Under this system an agreement is made between landlord and cash tenant whereby the latter pays an annual rent for the land he rents from the landlord. The tenant has his own animals and implements and finances the agricultural operations. In densely populated provinces landlords will auction the right to cultivate the land to the highest bidder, who very often must pay the rent in advance.

Frequently a cash tenant leases land without intending to work it himself. Instead he enters into an agreement with a share tenant who does the actual cultivation. Big absentee landlords prefer to lease their land to a few cash tenants instead of to thousands of share tenants, because under the cash tenancy system no labor, supervision or capital outlay is required on the part of the landlord. The same preference is held by the secular Church, the friars, and the corporations.

The prevailing form of tenancy is the share tenancy or kasama system, under which the landlord and tenant share the yield and the expenses of raising a crop. The division of the crop depends upon the contribution of the two parties to the budget required to produce the crop. A rather common kasama agreement obliges the landowner to furnish land, seed, and cash needed for transplanting and harvesting the rice, while the tenant does the labor with his own work animals. The crop is divided in equal parts after the tenant has paid in kind half of the expenses for transplanting and harvesting. The kasama will receive two-thirds and the landlord one-third of the crop if the former owns the animals and pays for the seed and all expenses connected with transplanting and harvesting. Under still another arrangement the landlord furnishes land, work animals, and seed. The harvest in this case is divided equally after the seed and the cost of transplanting and harvesting have been deducted.

Usually the tenant has neither funds nor rice for his family at the beginning of the agricultural year. He therefore gets an advance, or bugnos, from his landlord. This sum, varying from 25 to 125 pesos, usually bears no interest but is to be paid back in money or kind at the termination of the contract. In addition, the tenant receives a weekly or monthly ration of palay. The palay received up to the time of planting is usually paid back without interest, but the rations delivered after the crop has been planted are subject to high interest. It often happens, therefore, that the tenant is completely in the hands of the landlord, who has to support him until harvest time. Frequently tenants are so deeply in debt that their share of the crop does not suffice to meet the obligations. Instead of being able to draw upon their own rice during the off-season, in such cases, they must ask the landlord for new loans of money or palay and fall deeper and deeper into debt.

It is to the advantage of the landlord to have the tenant indebted to him, not only because of the high interest rates but also because the tenant can then be forced to do all kinds of extra work. On large farms and haciendas years often pass without a settlement of patuid, so that the tenant, not being able to read or write or to keep an account, does not know how much he owes. Kasamas rarely have a chance to get out of debt, and it is quite common for children to inherit their elders' debt. Kasamas are, on the whole, poorly clothed, poorly feed, and poorly housed, and many do not have a chance to secure an education for their children.

The poverty of the kasama is partly due to the smallness of the average kasama farm, which in 1939 covered only 2.88 hectares, including uncultivated as well as cultivated land. The average share-tenant actually cultivated only 2.22 hectares. More than one-half of all share tenants (53.9 percent) had farms of less than two hectares (Table 35).

4. Government Measures to Improve the Economic Conditions of the Small Farmers, Especially the Kasamas. The Philippine Government has been increasingly concerned with the agrarian problem because it constitutes a menace to public order. Before Pearl Harbor hardly a year went by without tenant farmers and agricultural laborers banding together in one part of the islands or another and attempting to seize the government and destroy caciquism. Government attempts to solve the agrarian problems have moved in three directions: (a) Legislative measures were taken to regulate the relationship between landlords and kasamas; (b) the government purchased landed estates in order to sell the land to the tenants; (c) the government sponsored agricultural colonization on public land.

a. The Rice Share Tenancy Act. In February 1933, under the administration of Governor-General Theodore Roosevelt, the Philippine Legislature passed Act No. 4054, "An act to promote the well-being of tenants (kasamas) in agricultural lands devoted to the production of rice and to regulate the relations between them and the landlords of said lands, and for other purposes." This law was designed to protect the kasamas against abuses and exploitation by the landlord. The caciques were, however, able to make the law ineffective by inserting the provision that the law could go into effect "only in provinces where the majority of the municipal councils shall, by resolution, petition for its application to the Governor-General, who shall make the law effective by proclamation." This provision made an enforcement of the law impossible because the cacique-controlled municipalities did not submit the necessary petition.

Table 35.- FARM TENURE: Number of Farms by size and Percent of Farms in Different Categories of Tenure. 1939. 1/

Size of Farm	All Farms	Percent of Total	Owners	Part Owners	Share Tenants	Share cash Tenants	Cash Tenants	Farm Managers	All Tenants
			Percent	Percent	Percent	Percent	Percent	Percent	Percent
Under .20 Hectares	36,795	2.3	3.4	.7	.6	1.2	2.9	8.4	1.3
.20 to .39 "	65,860	4.0	4.8	2.6	1.5	1.5	3.1	.3	3.6
.40 " .59 "	100,470	6.1	6.4	4.8	6.7	3.6	5.5	.7	6.4
.60 " .99 "	165,778	10.1	10.0	10.6	5.5	6.8	8.9	.6	10.1
1.00 " 1.49 "	310,318	19.0	17.6	18.6	10.7	20.5	22.4	1.2	21.1
1.50 " 1.99 "	178,735	10.9	9.9	13.3	21.1	12.6	12.7	.4	11.3
2.00 " 2.99 "	306,496	18.7	16.3	21.2	11.3	23.5	20.6	1.3	21.1
3.00 " 3.99 "	164,458	10.1	9.2	11.5	21.1	11.6	9.5	1.3	10.7
4.00 " 4199 "	94,106	5.8	5.8	6.2	10.2	6.3	5.2	1.1	5.5
5.00 " 9.99 "	142,587	8.7	10.3	8.2	6.5	9.3	6.3	4.5	6.8
10.00 " 10.99 "	48,367	3.0	4.4	1.8	3.6	2.0	1.7	8.6	1.5
20 Hectares and over	20,756	1.3	1.9	.5	1.2	1.1	1.2	71.6	.6
Total	1,634,726	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1/ Source: Census of the Philippines, Vol. II, 1939

When increasing unrest in the rice regions of central Luzon forced the National Assembly to reconsider the case of the kasamas it passed Commonwealth Act No. 178 which amends Act No. 4057 of 1933. Again the cacique groups prevented its general application by inserting the provision: "This Act ... shall take effect ... by proclamation to be issued by the President of the Philippines upon recommendation of the Secretary of Labor, when public interests so require, in the municipalities and on the date designated in such proclamation; and once enforced, its effects may similarly be suspended ..."

By issuing a proclamation on January 20, 1937, President Quezon made the Rice Share Tenancy Act effective in the five provinces of Bulacan, Nueva Ecija, Pampanga, Pangasinan, and Tarlac. Later proclamations extended it to the provinces of Albay, Bataan, Capiz, Cavite, Iloilo, Laguna, and six municipalities of Isabela. However, the application of the act to these provinces did not prevent disputes and clashes between kasamas and landlords. Some of the landlords were reported to threaten dismissal of any tenant who dared to demand observance of the act. In order to prevent wholesale dismissal of kasamas the National Assembly passed Commonwealth Act No. 461, which provides that a tenant may be dismissed only for reasons listed in the Rice Share Tenancy Act and then only with approval of a representative of the Tenancy Division of the Department of Justice. This act was amended by Commonwealth Act No. 608, which also provides compulsory arbitrations of all disputes by a representative of the Department of Justice and gives the landlord as well as the tenant the opportunity of appealing to the Court of Industrial Relations in case either objects to the decision of the Department of Justice.

Landlords held that Commonwealth Act No. 461, amended by No. 608, is unconstitutional because it deprives them of their right to dispose of their property as they please. On January 24, 1941 the Court of First Instance of Pampanga declared the two acts valid and constitutional.

There seems to be reason to believe that some of the disputes over the Rice Share Tenancy Act were due to ambiguous sections not easily understood by a simple, uneducated kasama. Some of the tenants were reported not to know that the landlord had the right to refuse a new contract if the tenant had not fulfilled his obligations under the contract covering the previous agricultural year. Leaders of tenant organizations, of which there are several in central Luzon, instructed their followers to stay on the farms under any circumstance, regardless of whether or not their eviction was actually justified under the Tenancy Act.

The main provisions of the Rice Share Tenancy Act are:

(1) Contracts between landlord and tenant must be written in the local dialect (Section 4).

(2) Contracts are good for one year unless there is an agreement to the contrary (Section 6).

(3) The cost of transplanting, harvesting, threshing, irrigation, and fertilizer, if any, are to be born equally by the two parties. The crop shall be divided equally (Section 8).

(4) All advances obtained by the tenant shall bear not more than 10 percent interest. On all loans other than money — such as palay — interest up to 10 percent may be added to the invoice price of the loan (Section 10).

(5) Fifteen percent of the crop must be left to the tenant regardless of the extent of his indebtedness (Section 14).

(6) The landlord cannot dismiss his tenant except for good reasons. The tenant cannot leave his landlord before the expiration of the contract except for a good cause (Sections 19 and 25).

Public statements by President Quezon and other high officials encouraged the kasamas in their struggle with the cacique. At the first convention of the National Commission of Peasants on July 16, 1939, at Cabanatuan, Nueva Ecija, Quezon declared: "The rights of the kasama are no less sacred than the rights of the landowners ... The landlords must realize by this time that the kasama is not a slave. The word kasama means partner or associate and it is as such that the law contemplates him to be. Under the law, the kasama is almost the owner of the land and cannot be ejected except for causes as enumerated in the statute..." After listening to such a statement the kasama was apt to remember that he "is almost the owner of the land and cannot be ejected" and to forget the qualification "except for causes as enumerated."

b. Government Purchase of Landed Estates. The Nacionalista Party stated in Article XI of its 1935 election platform. . "When the resources of the country so permit, we shall begin the expropriation of great estates, so that they may be divided into lots and sold to private citizens, preferably their actual occupants. We shall encourage the formation of small land ownership, which is the bulwark of democracy, the guarantee of public order, and a stabilizing force. It is our desire that every Filipino should own his land, the house in which he lives, and the farm he tills."

This promise was repeated in the Constitution of the Philippines, Article XII, Section 4: "The National Assembly may authorize, upon payment of just compensation, the expropriation of lands to be subdivided into small lots and conveyed at cost to individuals."

In July 1936 the National Assembly authorized the President to start negotiations for the acquisition of those portions of large estates which were occupied as home sites by tenants and to initiate expropriation proceedings should the negotiations prove to be unsuccessful. In October 1937, President Quezon created the Landed Estates Survey Committee, which was to plan a long-range program on the future policy regarding landed estates. Finally, late in 1938 the Commonwealth Government organized the Rural Progress Administration, entrusting it with the execution of the government policy on landed estates as set forth in Commonwealth Acts Nos. 20 and 378.

Late in 1941 the Rural Progress Administration controlled the home-site sections of eight large estates. The surveying and resale of the home sites proved rather difficult due to the attitude of the tenants who occupied them. The government bought the home sites in order to help tenants to get at least a home lot from which they could not be evicted even when dismissed as tenants from the farm land owned by the estates. In a number of instances tenants were reluctant to pay for the lots because tenant organizers led them to believe that the government would eventually distribute the lots free of charge. In other instances the tenants tried to block surveys.

c. Government-Sponsored Agricultural Colonization. The United States had introduced the homestead system into the Philippines in 1903 as a means of disposing of public lands. However, Filipinos, especially those of the old, densely settled lowland regions are accustomed to living in hamlets, villages and small towns and not on isolated farmsteads. This may partly explain why, to the surprise of American officials in the Philippines, Filipinos applied for homesteads in very small numbers during the early years. After 1912 the number of homestead applications grew slowly. During the years from July 26, 1904 to November 14, 1935, the beginning of the Commonwealth period, a total of 212,094 homestead applications were received by the Bureau of Lands, of which 81,086 were rejected, 21,577 cancelled, and 55,450 approved. Another 19,160 cases were still pending in November 1935. Only 34,821 applications or 16.4 percent of the total number had been patented between 1904 to 1935.

The large number of rejections and cancellations seems surprising in the face of the need for a better distribution of the population and the great number of landless families. Lack of surveys of the public domain is held chiefly responsible for the large number of rejections. For years potential homesteaders were not guided in their search but had to decide for themselves on the location of the land for which they wished to apply. Only upon receipt of an application did the Bureau of Lands determine whether the land actually belonged to the public domain, whether it had not been applied for previously, and whether the Bureau of Forestry considered it to be agricultural rather than forest land.

Failure to meet requirements regarding residence and cultivation led to the cancellations.

In 1913 the Philippine Government adopted the policy of actively encouraging the development of the public domain by establishing agricultural colonies. Applicants were not required to have funds of their own. The government advanced all necessary capital. Between 1913 and 1917 a total of seven colonies was founded in Mindanao. Two additional colonies were established outside of Mindanao: one in Bohol and the other in Luzon. This first adventure was not successful and in 1917 the government discontinued its activity of founding agricultural colonies because of the high costs and the limited results. Instead, it was decided to encourage actively only the emigration of "homeseekers" who had sufficient funds to tide them over the first year. Under no circumstances were homeseekers to receive loans. The Bureau of Labor, delegated to carry out this new policy, established the Interisland Migration Division. In order to qualify as a homeseeker entitled to the support of the Bureau of Labor, the prospective settler had to be at least 18 years of age, and to possess the necessary agricultural implements, a carabao, and

250 pesos. The Interisland Migration Division functioned from 1918 to 1939 and handled the migration of 9,172 families with 46,712 persons, most of whom migrated to Mindanao.

The Commonwealth Government realized the shortcomings of the efforts in the field of agricultural colonization. This is evidenced by the report of Manual Roxas, Chairman of the National Economic Council, that was submitted to President Quezon on October 22, 1938. Roxas wrote: "In no instance had there preceeded a careful study and selection of land to be settled nor of the people that were to be given state help to settle on these lands. No thought was apparently given to the important question of marketing the products of new settlers, neither was there any well-thought-out plan of assisting them to become efficient producers by providing for them demonstration and experimental stations or equipping them with modern tools and implements."

Upon the recommendation of Roxas and other advisers the National Assembly passed a law which created the National Land Settlement Administration (Commonwealth Act No. 441, approved on June 3, 1939). The objectives of the N.L.S.A. were formulated by law as follows:

(1) To facilitate the acquisition, settlement, and cultivation of lands, whether acquired from the Government or from private parties;

(2) To afford opportunity to own farms to tenant farmers and small farmers from congested areas, and to trainees who have completed the prescribed military training;

(3) To encourage migration to sparsely populated regions, and facilitate the amalgamation of the people in different sections of the Philippines;

(4) To develop new money crops to take the place of the present export crops which may suffer from the loss of preferences which they enjoy in the American market.

In order to attain these objectives the N.L.S.A. was empowered to hold public agricultural land for 25 years; to recommend to the President the reservation of public land suitable for agricultural colonization; to survey and clear land and distribute it to settlers; to establish and operate irrigation system trading stores, power and water-supply plants; and to engage in manufacturing, milling, lumbering, and in any other enterprise considered necessary for the success of its colonization activities.

In order to be acceptable settlers had to be Filipino or American citizens of legal age — preferably not over 40 — married, and with children. They, as well as their dependents, were to be healthy and fit for a pioneering life, to have agricultural experience, and to be of good character. The law further stated that settlers must be persons qualified to apply for public land under the Public Land Act.

A contract outlined the obligations of both the settler and the N.L.S.A. The settler's main obligations were to plant and cultivate the land given to him with such plants as were prescribed by the N.L.S.A.; to devote himself to this exclusively and not to engage in any other trade or occupation without the approval of the N.L.S.A.; not to transfer his land in any way, except by bequest, to any other person for the first ten years after receipt of the title to the land; to reimburse the N.L.S.A. — within 20 years at 4 percent interest — for transportation, building material, food, and any clothing that he might have received; to deposit all of his surplus products in the warehouses of the N.L.S.A. for sale through the Administration.

The Administration's obligations were to advance the costs of transportation for the settler, his family, and his belongings; to supply him with agricultural land; to supply him on a credit basis, with building materials and, if required, skilled assistance for the construction of his house, with food until he should become self-sufficient, with machinery such as tractors and plows to prepare the land, with seed and fertilizer, with livestock and agricultural implements; to sell on his behalf products deposited by him in the Administration warehouses; to give him full title to the land after all obligations should have been met. Payments were to begin after the third year and were not to exceed 30 percent of the proceeds of sales made through the Administration.

The N.L.S.A. chose the Koronadal Valley in Southeastern Cotabato as the site for its first large-scale colonization project. It began work there, in February 1939, and by February 1941 it had settled 2,513 settlers and their 8,163 dependents in the four districts of Lagao, Polomolok, Tupi, and Marbel. In addition to these settlers another 1,207 settler-applicants and their families accumulated in the four districts of Koronadal by February 1941.

In 1941 the directors of the N.L.S.A. decided to expand operations by taking in the Ala Valley, which runs parallel to Koronadal, and opening a settlement project in the province of Isabela in Luzon.

The N.L.S.A. encouraged its settlers to devote about one-half of their farms to subsistence crops such as rice, corn, sweet potatoes, and cassava and the other half to cash crops such as rubber, coffee, cocoa, cotton, soybeans, peanuts, cowpeas, Bermuda onions, and other crops for which there was a market in the Philippines. The type of the cash crop recommended depended upon the suitability of the different settlement districts. In each one of the latter the N.L.S.A. maintained an Administration farm. These were designed to function as experiment and demonstration stations as well as a seed and livestock farms from which settlers could be supplied seed and breeding stock. The N.L.S.A. managed the largest hog farm in the Philippines and had made a promising start with a thousand-hectare rubber plantation.

In order to help settlers to start with cultivation as quickly as possible, the N.L.S.A. used mechanical equipment on a large scale.

The work of the N.L.S.A. was interrupted by the war, but it is quite likely that the Commonwealth Government will try to resume the development of hitherto unused parts of the public domain by establishing agricultural colonies for settlers coming from the overcrowded sections of the Philippines.

PART V. GOVERNMENT AGRICULTURAL SERVICES BEFORE THE WAR

1. The Department of Agriculture and Commerce. A large part of the research, extension and regulatory functions of the Philippine government, with respect to agriculture, were centered in the Department of Agriculture and Commerce, which between 1918 and 1932 had been known as the Department of Agriculture and Natural Resources. Its work dealt with the commercial as well as the more strictly agricultural problems, although, in one way or another, all of its work was connected with agriculture. Its functions were performed through eight bureaus and six special divisions. The following descriptions of the most important of these from an agricultural point of view were applicable as of August 1, 1940.

The Bureau of Plant Industry dealt with pest control, plant improvement, and plant propagation. Its activities included research, extension and regulatory work, and the promotion of home industries. It maintained eleven agricultural experiment stations, five seed farms and substations, and three reservations; and in its field service there were eighteen Provincial Agricultural Supervisors.

The Bureau of Animal Industry dealt with disease and parasite control, animal improvement, animal husbandry, animal products, and meat and milk inspection. It maintained five stock farms and seventeen breeding stations; and there were district veterinarians in fifteen different veterinary districts, and eighteen livestock extension officers in the different provinces.

The Bureau of Commerce assisted farmers and manufacturers in marketing their products, undertook propaganda for the sale of goods, operated the National Produce Exchange, and distributed information regarding current prices of farm products.

The Bureau of Science conducted technical investigations into problems relating to agriculture and industry, including the use of agricultural by-products, and it had much to do with the maintenance of correct weights and measures.

The Bureau of Forestry administered the public forests. One of its important functions was to classify lands, segregating those areas determined to be most suitable for forest purposes and those most suitable for agricultural purposes.

The Bureau of Lands was entrusted with the custody, administration and disposition of all tracts of land of the public domain classified by the Bureau of Forestry as alienable and disposable. It made concessions of the public land, conducted surveys, and segregated private land from the public domain.

Other bureaus were the Weather Bureau and the Bureau of Mines.

Of the Special Divisions, the Fiber Inspection Service established and maintained official standards for abaca and other fibers intended for export, and operated inspection stations to enforce regulations supporting these standards.

The Division of Statistics, over a period of years, collected, compiled and published statistical data on Philippine crops and livestock, on foreign and domestic trade, and on numerous other subjects. In 1941 it became a part of the new Bureau of Census and Statistics.

The Division of Soil Survey undertook work relating to the classification and mapping of soils. Its activities also included studies relating to the fertility of soils and means of improving it.

Other Special Divisions were the Division of Fisheries, the Natural History Museum Division, and the Division of Publications.

Quite obviously, from this description, the field service of the Department of Agriculture and Commerce extended throughout the islands. In 1940, a representative of at least one Bureau or Special Division was in every province, and in the larger provinces the important services were usually all represented. Experiment stations, stock farms and veterinary stations also were widely distributed. A detailed statement of these stations and field service representatives is available in an official publication (13).

2. Agricultural Education.

The principal government agricultural college was maintained at Los Banos, Luzon. This institution did work on a college level in each of the principal fields of agriculture. It carried on research work and prepared students for research, government service, and teaching.

Special emphasis has been placed on the development of vocational agricultural high schools. In order to develop a basis for utilizing a scientific agricultural education it was recommended by the National Economic Commission that appropriations be made for the establishment in every province of agricultural high schools similar to the Central Luzon school at Munoz. The Munoz school has been thought by some to be very successful in teaching the students actual farming and enabling them to make their way through school by operating land during the time they were obtaining their education. Some doubt exists, nevertheless, whether these agricultural high schools have successfully achieved their main purpose, of establishing their students on farms.

3. The National Rice and Corn Corporation. This agency was formed with the purpose of regulating the supply of rice, with the hope that it would give farmers a just price for their crop and insure the consumer at all times a steady supply of rice at a reasonable price. In case of a rice deficiency, the Corporation was authorized by Executive Order to import rice free from duty. After estimating the amount required, with the aid of the Department of Agriculture and Commerce, they would import such rice at intervals, selling the imported rice as a means of maintaining rice prices at fixed levels.

This was the principal work of the Corporation, but it was intended also to deal with overproduction. The sponsors believed that domestic requirements would be met from domestic production in a few years and that the problem of overproduction would then require attention. In anticipation of this, studies of various matters were made. Actually this problem did not arise, but in order to prevent dumping of cheap rice, and a lowering of prices, tariffs were established when deemed necessary.

In its operations, this agency constructed and operated bonded warehouses, where farmers could deposit their crop and wait for a more favorable market. While on deposit, a farmer was allowed to secure a loan up to 70 percent of the market value of his crop. In this program the Corporation entered the market as a buyer and miller of palay, providing an alternative to the usual process of selling to Chinese merchants. Thus, one of its objectives was to put the rice industry under the control of Filipinos (4).

PART VI. CHANGES SINCE THE JAPANESE OCCUPATION

As this handbook is being written, intelligence reports and actual occupation are making clear, to those close to the situation, the details of the current conditions of agriculture and food supply in many parts of the Philippines. There seems little value, therefore, in attempting at this time to make a detailed analysis of the present situation on the basis of the incomplete information which as yet is generally available. Accordingly, all that will be attempted here is to indicate some of the major changes that have taken place during the Japanese occupation, as they appear from less specific sources of information, and to suggest in general terms what these changes mean with respect to food supply and agricultural rehabilitation. Detailed planning with regard to food requirements or agricultural rehabilitation will require the more complete information which now is beginning to become available.

1. Factors Which Have Affected Agricultural Production and Food Supply

a. Reduction in Livestock Numbers. Reports agree that a very serious reduction in the number of livestock has occurred. Probably not more than 30 to 40 percent of the former number of cattle and carabaos still remain in most parts of the Philippines, and in some parts the percentage remaining is still smaller. Swine, goats and poultry have also been greatly reduced. One important factor behind this reduction has been the need for meat, caused in part by a reduction in the supply of fish. Another reason has been a shortage of grains, so that farmers felt they could not keep livestock. There also has been an unusual utilization of animals by armed forces both of the guerillas and the Japanese. So serious had the reduction become, by March 1944, that an attempt was made by the puppet authorities to prohibit the further slaughter of livestock. Liberation will find the number of work animals seriously depleted, and the supply of animal protein foodstuffs much reduced.

b. Farmer Resistance. A further important factor affecting agricultural production, particularly in areas which once produced a surplus, was the loss of an incentive to produce more than required for the needs of the family. Consumer goods were scarce, so that little of actual value could be obtained in exchange for the rice sold. As time went on, also, there was increasing resentment against the Japanese because of the methods used in collecting rice and the harsh measures employed in dealing with them on other matters. In the face of this treatment the farmers found little reason to produce more than was necessary, and they resisted efforts which tried to induce them to do so.

c. Elimination of Interisland Shipping. As has been made clear in an earlier discussion, many islands were dependent for a large part of their supply of foodstuffs upon interisland shipping. By means of this shipping, rice was transported from Manila to Cebu and other deficit spots, and livestock and cereals were shipped from Mindanao to adjoining islands, even as far as Manila. As a consequence of the Japanese attack and occupation, the number of ships available for this service was at once drastically reduced, and other factors combined eventually to eliminate a large part of all except the small number directly under the control of the Japanese, which were used mainly to transport supplies for the Japanese forces. As a result, islands which formerly were dependent upon outside sources for a considerable quantity of foodstuffs became forced to live largely on what they themselves could produce.

d. Disturbed Conditions. The presence of a large body of Japanese troops, combined with an increasing amount of guerilla warfare against them, also helped to reduce the quantity of crops produced. The movement of troops disturbed the activity of farmers, and fighting inevitably involved the destruction of a certain amount of growing crops. Crops in the field sometimes were deliberately burned by the Japanese, a bad food situation being reported in the Ilocos Provinces and Abra on this account. In some instances, fear of the Japanese caused farmers to abandon their land. Reports indicate that, from this cause, a considerable acreage of paddy rice went unplanted during 1944 on Luzon and other islands. The Japanese troops themselves, living to some extent off of local production, helped reduce the supply of foodstuffs.

2. Changes in Agricultural Production.

a. Rice. No subject was mentioned more often in broadcasts from Manila during 1943 and 1944 than the shortage of rice. Broadcast after broadcast referred to this subject, in ways which made it seem quite likely that the shortage was not confined to the city of Manila itself. More recent reports confirm this presumption. Nueva Ecija produced much less than formerly, but probably had a small surplus for use in Manila. Tarlac is reported to have had a good crop, and it appears that there was a certain amount of surplus in Pangasinan, Pampanga and Bulacan. As far as can be judged for the region as a whole, the 1944 crop of central Luzon should have been sufficient to meet the requirements of the provinces of that region, and to allow a small surplus for use in the city of Manila or the Ilocos region. It seems improbable that this surplus is sufficient to meet the needs of Manila until the next harvest. In the

Cagayan Valley, any surplus that may have been produced will undoubtedly be used or destroyed by the Japanese retreating through that region; so that nothing should be counted on from there for use elsewhere in 1945.

In the Visayan area and on Mindanao, also, the production of rice has declined. Reports state that a large number of farmers abandoned rice fields in Agusan and the Misamis Provinces, Mindanao, fleeing to unoccupied territory in the hills; and the same has probably occurred elsewhere. A particularly severe shortage of rice may therefore be expected in the occupied portions of these islands.

On the basis of this estimate of the situation, it seems probable that the production of palay in central Luzon, in 1944, was somewhere between 100,000 and 200,000 metric tons short of the production of 1938, or, very roughly, 15 to 25 percent of 1938 production. If the reduction was as great for the islands as a whole, the total quantity of the reduction, in terms of palay, would be somewhere between 275,000 and 450,000 metric tons.

b. Corn. Reports with regard to the production of corn are conflicting, and it seems likely that the situation differed in different areas. In the hills, where corn normally was grown, its production was probably increased to some extent to make up the shortage created by the loss of rice imports. On the other hand, root crops, which often would produce a larger quantity of starch-supplying foodstuffs, were sometimes chosen in preference. In areas under Japanese control, corn was one of the crops desired by the Japanese, and production seems to have declined.

c. Root Crops. The production of root crops increased greatly in most unoccupied areas, in order to supply foodstuffs for the population that had become almost entirely dependent upon local production. Sweet potatoes and cassava were the types most commonly used, although gabi and other minor root crops were also planted. The production of these crops may have doubled or tripled, mainly through a use of idle land and an increase in caingin cultivation. Bananas also were eaten in increased quantities, and coconuts likewise. Quite certainly the increased production and consumption of these crops helped reduce the shortage in basic foodstuffs created by the war in practically all unoccupied portions of the islands. But the extent to which the shortages have thereby been alleviated is a matter for investigation when the opportunity permits.

3. Cotton. Cotton received an unusual amount of attention from the Japanese because of the general shortage of this commodity in the Japanese dominated area. Efforts to increase its production in the Philippines have been confined almost entirely to central Luzon, with Batangas Province receiving prominent mention. Land for cotton appears to have come in part from land formerly in sugarcane. A particularly large program was attempted for planting in 1943, using seed imported from North China and Taiwan. Enthusiastic claims have been made concerning the success of this project, and some success may have been achieved.

4. Sugarcane and Sugar. The acreage in sugarcane in 1944 appears to have been very short of that of the pre-war period. This decline may have been greater on Negros than Luzon, although reports indicate that the decline was very considerable in both areas. It is to be expected, for 1945, that farmers will not plant new acreage unless contracts are given and a return for their crop assured. This would require action during the first half of 1945, lacking which the cane to be milled in 1946 would be limited to ratoon crops from fields still capable of supporting them.

It is also quite clear that the amount of sugar available to the Filipinos has been very appreciably reduced. The centrals were entirely in the hands of the Japanese, who used the output, whether of sugar or alcohol, for their own purposes. Domestic consumption has been limited to the local production of panocha or muscavado. This has not been sufficient to supply the demand, although apparently available in such quantity that the shortage does not constitute a serious problem.

5. Coconuts. Coconut trees are not easily destroyed, and little reduction in acreage of coconuts is expected except in limited areas where intense military operations have occurred. During the Japanese occupation the production of copra has declined greatly. Reports indicate that a good crop of ripe nuts should be available upon liberation for the making of copra.

The reestablishment of the copra industry, therefore, should require little more than an adequate supply of the simple equipment ordinarily used in copra drying, together with a collection organization and an incentive to produce. This incentive would probably be found in a supply of food and consumer goods in which the population has been deficient. A possible retarding factor may be found in weeds and brush grown up during several years of neglect.

6. Abaca. With respect to abaca, particularly in Davao Province, stalks were probably harvested about as formerly until late in 1944, although little mention has been made of this crop. Plantings which have not been neglected for more than a year should remain in fairly good condition. Some of the oldest stalks may have passed beyond the stage of usefulness, but the total number of harvestable stalks would probably be larger than ordinarily harvested at one time. Where plantings have not been destroyed, therefore, a good crop of abaca fiber might reasonably be expected. Equipment and an incentive may be required to reestablish the industry, and since a part of the labor formerly was Japanese, an outside source for a portion of the labor may have to be found. On Luzon and nearby islands, some of the plantings may be discovered, upon liberation, to have been neglected for more than a year, and weeds and other growth will have to be cleared out before harvesting is done.

7. Tobacco. Tobacco production appears to have declined. Broadcasts from Manila state that the 1943 crop was expected to be sufficient to supply the demands of the Philippines, but even this is doubtful.

Table 36.-PRINCIPAL SUBSISTENCE CROPS: Total Acreage and Production, 1931-1940 According to estimates of the Division of Statistics

Acreage

Crop	Unit	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940 a/
Palay	1,000 Hectares	1,791	1,782	1,854	2,004	1,964	2,049	2,061	1,912	1,964	1,997
Corn	" "	524	577	629	539	567	685	659	703	593	554
Sweet Potatoes	" "	72	74	75	78	75	75	74	78	83	69
Bananas	" "	113	113	103	108	95	92	92	92	93	93
Cassava	" "	15	15	17	14	16	16	16	16	16	25
Eggplants	" "	9	8	8	8	8	8	8	9	8	10
Tomatoes	" "	7	7	6	7	8	8	8	8	8	8
Gabe	" "	12	11	12	13	13	13	13	13	13	9
Mungo	" "	8	8	8	8	5	5	4	6	5	6
Peanuts	" "	8	8	7	6	6	6	6	6	7	7
Dry Beans	" "	11	10	9	9	9	9	8	9	11	15
Pineapples	" "	4	4	3	3	4	4	4	5	5	7

Production

Crop	Unit	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940 a/
Palay	1,000 Cavanes	49,640	47,299	47,843	53,001	45,834	42,220	55,016	52,345	54,599	56,571
Corn	" "	5,941	7,150	7,237	5,942	5,185	6,371	7,678	8,782	7,360	6,812
Sweet Potatoes	Metric Tons	175,864	222,506	211,104	213,926	201,075	199,190	198,676	202,277	215,304	172,536
Bananas	1,000 Bunches	61,356	61,366	53,613	56,075	41,172	39,779	47,627	47,858	48,801	49,273
Cassava	Metric Tons	25,921	35,494	40,864	67,871	76,862	77,202	76,934	73,765	72,243	118,823
Eggplants	" "	10,858	10,963	10,171	10,539	10,461	10,800	10,800	11,819	11,806	12,892
Tomatoes	" "	9,049	12,302	11,229	11,123	14,305	15,691	15,851	16,098	15,924	14,727
Gabe	" "	23,824	26,243	29,177	29,675	31,019	31,685	30,091	30,998	30,237	20,802
Mungo	" "	5,821	5,424	5,536	5,855	2,816	2,783	2,329	3,209	2,994	3,236
Peanuts	" "	4,442	4,511	4,185	3,639	3,341	3,674	3,780	3,815	3,995	4,221
Dry Beans	" "	4,344	4,800	4,159	4,650	4,805	4,807	4,129	4,406	5,101	5,992
Pineapples	1,000 Fruits	9,286	15,565	10,960	11,128	14,977	16,233	16,121	18,222	19,109	24,801

Source: 1931-1938. Division of Statistics, Department of Agriculture and Commerce, Bulletin of Philippine Statistics, vol. 6, 1939.
1939 and 1940 Preliminary estimate of Agricultural Production in the Philippines for the Crop-year ended June 30, 1940.
Paul P. Steintorf, American Consul, Manila, August 14, 1940.

a/ Preliminary

Table 37.-PRINCIPAL COMMERCIAL CROPS: Total Acreage and Production, 1931-1940
According to Estimates of the Division of Statistics.

Acreage

Crop	Unit	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940 a/
Coconuts	Hectares	561,450	566,100	600,700	608,200	617,890	630,980	637,950	643,110	645,640	652,740
Abaca	"	484,880	467,040	447,170	458,610	488,120	478,880	502,710	508,340	517,480	513,740
Sugarcane	"	256,180	253,110	268,460	297,930	211,090	250,750	257,060	227,930	186,450	238,750
Tobacco	"	74,390	78,230	74,610	55,430	61,520	65,480	74,040	74,796	70,130	72,510
Maguey	"	37,830	35,130	30,980	30,178	31,749	38,290	37,850	38,800	39,710	37,270
Cotton	"	376	725	850	857	1,107	1,982	2,004	1,925	1,790	2,010
Kapok	"	6,425	7,657	7,690	7,404	7,525	7,572	7,586	7,669	7,650	7,690
Coffee	"	1,243	1,295	1,447	1,430	1,501	1,503	1,548	1,557	1,600	1,640

Production

Crop	Unit	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940 a/
Coconuts											
Total nuts gathered	Million Nuts	1,869	1,944	2,142	2,114	2,874	3,147	2,983	3,450	4	4
Copra	1,000 Piculs	6,635	6,422	7,471	7,514	9,789	10,291	8,251	11,032	12,248	13,014
Abaca	" "	2,564	2,062	2,126	2,850	3,171	3,083	3,172	2,607	3,056	3,009
Tobacco	1,000 Quintals	946	981	908	710	623	701	725	781	733	791
Maguey	1,000 Piculs	180	128	93	170	236	434	377	280	305	240
Cotton	Metric Tons	74	147	177	199	197	492	499	480	450	542
Kapok	" "	788	1,239	1,254	1,163	1,344	1,408	1,414	1,452	1,504	1,524
Coffee	" "	1,408	1,090	1,013	1,024	700	745	931	954	1,009	1,194

Source: 1931-1938. Division of Statistics, Department of Agriculture and Commerce, Bulletin of Philippine Statistics, vol. 6, 1939.
1939 and 1940 Preliminary estimate of Agricultural Production in the Philippines for the Crop-year ended June 30, 1940.
Paul P. Steintorf, American Consul, Manila, August 14, 1940

a/ Preliminary.

Table 38.-SUGAR: Sugar centrals and refineries, 1941

Factory	Location	Owner	Capacity (Tons cane per 24 hrs.)
Luzon			
Arayat	Arayat, Pampanga	Mount Arayat Sugar Co., Inc.	1,250
Bataan	Balanga, Bataan	Bataan Sugar Company, Ind.	300*
Calamba	Canlubang, Laguna, Luzon	Calamba Sugar Estate	5,000
Calatagan	Calatagan, Batangas	Central Azucarera de Calatagan	700
Calumpit	Calumpit, Bulacan	Luzon Sugar Co., Inc.	500
Don Pedro	Nasugbu, Batangas	Roxas y Cia	2,600
El Real	Calamba, Laguna	Philippine Sugar Estates Development Co.	750
Luzon	Central Luzon, Tarlac	Central Luzon Milling Co., Inc.	1,724*
Mabalacat	Mabalacat, Pampanga	Mabalacat Sugar Company	260
Manaoag	Manaoag, Pangasinan	Hind Sugar Co.	400
Norte (Candon)	Candon, Ilocos Sur	Central Azucarera del Norte	380
Pampanga	Del Carmen, Pampanga	Pampanga Sugar Mills	4,970*
Paniqui	Paniqui, Tarlac	Paniqui Sugar Mills, Inc.	816*
Pasudeco	San Fernando, Pampanga	Pampanga Sugar Development Co., Inc.	4,800*
Tarlac	San Miguel, Tarlac	Central Azucarera de Tarlac	6,000
University	Laguna	College of Agriculture, University of Philippines	5*
Negros			
Bacolod-Murcia	Bacolod, Occidental Negros	Bacolod-Murcia Milling Co., Inc.	3,348*
Bais	Bais, Occidental Negros	Central Azucarera de Bais	3,500
Bearin	Kabankalan, Occ. Negros	Kabankalan Sugar Co., Inc.	850
Binalbagan	Binalbagan Occ. Negros	Binalbagan Estate, Inc.	3,400
Danao	Escalante, Occ. Negros	Central Azucarera del Danao, Inc.	700
Hawaiian-Philippine	Silay, Occ. Negros	Hawaiian-Philippine Co.,	3,300
Isabela	Isabela, Occ. Negros	Isabela Sugar Co., Inc.	2,044*
La Carlota	La Carlota Occ. Negros	Central Azucarera de la Carlota	4,300
Leonor	Escalante Occ. Negros	Central Leonor	400
Lopez	Fabrica, Occ. Negros	Lopez Sugar Central Mill Co., Inc.	1,300
Lumangub	Talisay, Occ. Negros	Central de la Rama	360
Ma-ao	Bago, Occ. Negros	Ma-ao Sugar Central Co., Inc.	3,000
Manapla	Manapla, Occ. Negros	North Negros Sugar Co., Inc.	2,400*
Palma	Ilog, Occ. Negros	Central Palma	600
San Carlos	San Carlos, Occ. Negros	San Carlos Milling Co., Ltd.	3,000

Table 38 .- (Continued - 2)

Factory	Location	Owner	Capacity (Tons cane per 24 hrs.)
Negros (Continued)			
San Isidro	Bago, Occidental Negros	Central de la Rama	680
Talisay-Silay	Talisay, Occ. Negros	Talisay-Silay Milling Co., Inc.	3,334*
Victorias	Victorias, Occ. Negros	Victorias Milling Co.	2,174
Panay			
Asturias	Dumalag, Capiz, Panay	Asturias Sugar Central, Inc.	1,300
Janiuay	Janiuay, Iloilo	Philippine Starch & Sugar Co.	600*
Lourdes	Dingle, Iloilo, Panay	Central Lourdes	150
Pilar	P.O. Box 71, Pilar, Capiz, Panay	Central Azucarera de Pilar	750
Santos-Lopez	Barotac, Nuevo, Iloilo	Central Santos- Lopez Co., Inc.	1,000
Sara-Ajuy	Ajuy, Iloilo	Elizalde & Co., Inc.	787*
Cebu			
Bogo-Medellin	Medellin, Cebu	Bogo-Medelin Milling Co., Inc.	1,000
Cebu	Talisay, Cebu	Cebu Sugar Company	533
Leyte			
Ormoc	Ormoc, Leyte	Ormoc Sugar Co., Inc.	700
⨍ Rosario	Ormoc, Leyte	Rosario Sugar Mills	250
Mindoro			
Mindoro	San Jose, Mindoro	Philippine Milling Co., Inc.	1,300

* Average milled (24 hours). ⨍ Closed, cane milled at Ormoc Sugar Company.

Refineries

Refinery	Location	Owner or Manager	
Insular	Manila	Insular Sugar Refining Corp. (Government owned)	1,067,210 1/
* Malabon	Malabon, Rizal	Malabon Sugar Company	
Victorias	Victorias Occ. Negros	Victorias Milling Company	2,400 2/

* Closed, quota transferred to Insular. 1/ Production, bags (100 lb.). 2/ Daily capacity, metric tons.

Source: Sugar Reference Book and Directory, Vol. 10. E. W. Mayo, Editor, New York - 1941, pp. 109-110.

Table 39 .- FOREIGN TRADE: Imports of principal agricultural products, 1935-1940

CEREALS & PRODUCTS	UNIT OF QUANTITY	1935	1936	1937	1938	1939	AVERAGE 1935-1939	1940	JAN.-SEPT., 1941
Barley (malt)	Metric Tons	374	673	557	816	1,167	717	1,513	1,174
Rice									
glutinous	" "	4,580	5,668	6,362	6,159	8,490	6,252	7,883	2,323
Non-glutionous	" "	2,690	85,906	67,639	3,220	75,143	46,920	30,379	9,011
Corn									
in grain	" "	3	10	3	7	6,585	1,322	11	528
in starch	" "	4,261	5,095	2,328	3,573	4,752	4,002	4,731	5,317
Oats	" "	186	470	276	408	476	363	492	352
Oatmeal	" "	339	473	455	555	530	470	499	474
Wheat flour	" "	71,454	91,655	75,288	92,471	100,264	86,226	102,085	92,696
Other cereal flour	" "	58	49	32	23	20	36	85	20
Bread & biscuits	" "	607	650	693	717	549	634	256	2
Cakes & puddings	" "	31	35	38	51	40	39	52	26
Macaroni, vermicelli, etc.	" "	1,894	2,152	2,356	2,280	2,325	2,201	1,920	1,246
Cereals prepared for table use	" "	151	137	128	145	153	143	170	68

Table 39.- (Continued - 2)

	UNIT OF QUANTITY	1935	1936	1937	1938	1939	AVERAGE 1935-1939	1940	JAN.-SEPT., 1941
ANIMALS & MEATS									
Animals									
Cattle	No.	116	54	42	86	86	77	72	-
Horses	"	2,444	4,566	252	238	166	1,533	81	-
Paultry & game	"	-	-	3,992	4,559	2,911	3,821 (3 yr. av.)	3,622	783
Meats									
Fresh									
Beef	Metric Tons	1,921	1,446	1,144	1,137	918	1,313	631	530
Mutton	" "	130	144	103	152	116	129	135	82
Pork	" "	230	102	81	88	73	115	112	50
Poultry & game	" "	91	92	53	79	62	75	46	3
Other	" "	331	39	59	43	57	106	170	35
Canned									
Beef	" "	1,305	1,049	1,147	1,673	1,369	1,309	1,364	238
Pork	" "	167	103	106	189	144	142	130	1
Sausage	" "	225	261	422	254	378	308	421	243
Other	" "	50	99	173	229	148	140	184	67
Dried, smoked, etc.									
Bacon	" "	100	108	83	117	94	100	69	65
Ham	" "	607	533	487	514	1	428	1	(z)
Poultry & game	" "	15	14	15	37	31	22	44	8
Sausage	" "	162	149	133	182	154	156	146	73
Other	" "	8	5	6	5	4	6	22	15
Meat Products									
Lard	" "	132	140	160	86	100	124	65	-
Lard compounds	" "	101	132	42	60	45	76	47	-
Oleomargarine	" "	51	66	49	41	33	48	11	-
Other	" "	13	14	22	13	22	17	12	N.R,

Table 39.- (Continued - 3)

	UNIT OF QUANTITY	1935	1936	1937	1938	1939	AVERAGE 1935-1939	1940	JAN.-SEPT., 1941
DAIRY PRODUCTS									
Butter	Metric Tons								
Frozen	" "	635	635	503	671	505	590	566	577
Canned	" "	77	82	98	83	108	90	64	45
Cheese	" "	260	356	353	506	556	406	373	173
Milk									
Condensed	" "	5,330	5,243	5,687	6,958	6,449	5,933	6,312	3,746
Evaporated	" "	10,849	13,668	13,580	15,271	14,907	13,655	16,502	14,251
Natural	" "	427	552	573	744	995	658	411	508
Powder	" "	266	363	269	343	424	333	472	542
Buttermilk	Liter a/	14,315	20,621	3/ 12	3/ 10	3/ 24	3/ 16	3/ 30	3/ 21
		(36 M. T.)							
FISH									
Fresh	Metric Tons	110	191	141	111	216	154	162	44
Canned									
Mackerel	" "	980	926	1,904	708	807	1,065	704	219
Cuttle Fish	" "	-	-	-	96	131	114 (2 yrs.)	284	362
Salmon	" "	779	1,170	1,394	1,963	921	1,245	701	394
Sardines	" "	7,554	8,527	10,828	10,658	12,058	9,925	7,397	6,340
Shell fish	" "	208	311	281	424	415	328	386	421
Other	" "	1,610	2,988	2,005	221	168	1,398	167	15
Dried, smoked, etc.									
Cod fish	" "	1,595	1,327	1,223	833	454	1,086	119	43
Shell fish									
Shrimps	" "	179	140	125	263	339	209	335	222
Other shell fish	" "	127	109	123	60	46	93	58	10

Table 39.- (Continued - 4)

	UNIT OF QUANTITY	1935	1936	1937	1938	1939	AVERAGE 1935-1939	1940	JAN.-SEPT., 1941
FISH (Cont.)									
Dried, smoked, etc. (cont.)	Metric Tons								
All other Dried, smoked fishes	" "	466	439	505	506	417	467	375	45
Other fish and fish products	" "	7	14	1	(z)	1/ 11	7	2/ 63	N.R.
VEGETABLES									
Fresh									
Cabbage	" "	651	409	227	406	193	377	120	10
Cauliflower	" "	46	53	31	60	56	49	42	16
Celery	" "	184	155	113	132	1/ 38	124	135	71
Garlic	" "	2,014	1,927	1,657	1,457	2,843	1,980	2,996	1,858
Lettuce	" "	143	131	75	105	78	106	96	56
Onions	" "	13,480	11,781	10,637	12,299	11,450	11,929	10,948	6,366
Potatoes	" "								
Irish	" "	12,066	10,432	10,936	11,824	10,069	11,065	10,060	5,978
Sweet	" "	35	23	18	22	1/ 1	20	2/ 4	N.R.
Miscellaneous	" "	687	599	413	712	519	586	440	139
Canned									
Bamboo sprouts	" "	50	54	63	82	48	59	73	32
Beans	" "	435	515	569	568	554	528	722	749
Corn	" "	223	209	181	247	222	216	776	165
Mushroom	" "	31	32	45	51	44	41	34	20
Peas (green)	" "	510	553	566	499	544	534	536	480
Tomatoes	" "	866	452	668	388	453	565	428	272
Other	" "	891	840	1,043	876	805	911	665	494

Table 39.- (Continued - 5)

	UNIT OF QUANTITY	1935	1936	1937	1938	1939	AVERAGE 1935-1939	1940	JAN.-SEPT. 1941
VEGETABLES (Cont.)									
Dried									
Bamboo sprouts	Metric Tons	18	23	19	39	37	27	12	18
Beans (Mungo)	" "	5,973	5,370	5,729	5,021	6,200	5,659	5,062	2,019
Mushroom	" "	35	38	38	148	40	60	50	23
Peas, chick	" "	109	76	291	230	500	241	283	323
Other	" "	122	130	200	314	198	193	206	129
Pickled	" "	1,128	1,295	1,446	1,399	1,370	1,328	2,076	974
Sauces	" "	1,696	1,775	2,218	2,312	2,474	2,095	2,403	1,617
Juice	" "	122	208	172	101	114	143	109	71
Vegetable preparations									
Potato starch	" "	120	121	142	136	92	122	72	25
Tapioca	" "	844	1,002	1,890	2,139	1,265	1,428	811	1,097
Other starch	" "	12	32	19	16	29	22	21	11
Other veg. products	" "	12	27	63	39	37	36	37	36
FRUITS									
Fresh									
Apples	" "	2,464	2,754	1,908	3,077	2,600	2,561	3,065	1,787
Grapes	" "	892	1,096	284	1,313	1,338	985	1,080	582
Lemons	" "	246	213	164	191	150	193	186	126
Oranges	" "	4,911	4,815	4,592	5,704	5,908	5,186	5,940	3,493
Pears	" "	263	442	346	360	256	333	236	101
Pumeloes	" "	500	462	316	476	617	474	404	129
Other	" "	211	614	454	466	325	414	195	24

Table 39 .- (Continued 6)

	UNIT OF QUANTITY	1935	1936	1937	1938	1939	AVERAGE 1935-1939	1940	JAN.-SEPT., 1941
FRUITS (Cont.)									
Dried	Metric Tons								
Prunes	" "	111	295	116	524	572	324	463	226
Raisins	" "	305	329	305	377	418	347	513	305
Other	" "	151	166	153	128	80	136	247	89
Preserved									
Canned									
Pineapple	" "	209	345	329	439	265	317	275	172
Peaches	" "	-	-	-	187	232	210 (2 yr.)	294	205
Jams, Jellies	" "	147	138	136	120	131	134	116	92
Other	" "	728	899	863	825	690	801	2/ 946	281
Pickled									
Olives	" "	97	115	260	257	1/ 37	153	2/ 136	-
Other	" "	69	85	95	133	287	134	321	120
Fruit Products									
Vinegar	a/ Liter	111,182	141,249	103,475	95,478	113,839	113,045	127,905	81,887
Other	Metric Tons	14	25	31	25	32	25	39	35
NUTS									
Chestnut	" "	205	277	458	359	473	354	577	239
Peanut	" "	1,281	1,144	1,052	590	1,214	1,056	467	85
Other	" "	156	149	84	168	151	142	2/ 81	6
EGGS									
Fresh									
Duck	1,000 doz.	597	639	117	705	1,159	643	1,188	119
Hen	" "	983	1,283	1,519	571	523	976	1,279	248

Table 39.- (Continued - 7)

	UNIT OF QUANTITY	1935	1936	1937	1938	1939	AVERAGE 1935-1939	1940	JAN.-SEPT., 1941
EGGS (Cont.)									
Preserved	1,000 doz.								
Duck	" "	16	34	30	11	24	23	41	3
Egg yolks	Metric Tons	1	1	9	3	4	3	4	2
Dried, hen's	1,000 doz.	N.R.	N.R.	N.R.	N.R.	1,681	1,681 (1 yr.)	15	1
TROPICAL PRODUCTS									
Cocoa									
Crude	Metric Tons	1,932	1,048	1,444	1,596	2,350	1,674	1,635	1,738
Manufact.	" "	878	1,358	1,202	1,600	566	1,121	171	200
Coffee									
Raw	" "	3,546	3,513	3,433	4,714	6,180	4,277	5,289	4,919
Roasted	" "	140	276	175	130	218	188	290	285
Tea	" "	224	238	259	244	242	241	348	89
TOBACCO									
Leaf	" "	203	303	467	808	647	486	1,143	-
Cigars	Number	205	696	6,235	37,005	61,000	21,028	54,000	-
Cigarettes	No. in million	2,056	1,894	1,829	4,022	3,758	2,712	4,091	-
SUGAR & SUGAR SUBSTITUTES									
Glucose	Metric Tons	1,523	1,768	1,972	2,187	1,772	1,844	1,879	1,888
Sugar, refined	" "	158	169	125	100	111	133	95	79
Molassas & sirup	" "	100	121	74	54	35	77	134	29
Honey	" "	-	-	12	19	45	15	15	10
Candies	" "	-	-	1,236	893	1,035	1,054 (3 yr.)	411	87

Table 39.- (Continued - 8)

	UNIT OF QUANTITY	1935	1936	1937	1938	1939	AVERAGE 1935-1939	1940	JAN.- SEPT., 1941
OILS									
Copra	Metric Tons	4,301	875	328	47	180	1,146	182	256
Animal	a/ Liter	110,229	103,324	287,435	168,010	156,868 1/	165,173	344,177 2/	-
Vegetable	Metric Tons								
Cottonseed	" "	178	231	192	210	308	224	1,088	182
Linseed	" "	645	840	1,090	948	1,148	934	760	558
Olive Oil	" "	127	177	78	147	82	122	132	21
Peanut Oil	" "	352	363	671	416	470	454	418	222
Palm Oil	" "	254	244	387	425	103	271	820	760
Other	" "	141	107	52	59	1/ 29	78	2/ 208	-
MISCELLANEOUS									
Salt, table	" "	12,373	8,517	716	4,006	9,343	6,991	59	4
Spices	" "	138	185	139	141	152	151	116	120
Fodder & Feed									
Fish meal	" "	305	440	489	870	502	521	649	156
Fodder	" "	379	268	582	113	780	424	517	169
Bran	" "	223	1,136	576	626	1,341	780	637	81
Farm Machinery									
Tractors	Number	110	128	160	121	1/ 35	111	2/ 232	-
Rice threshers	"	38	42	19	11	1/ 23	27	13	-
Fertilizers									
Animal & Veg.	Metric Tons	540	28	255	69	126	204	126	
Chemical									
Mixed fert.	" "	12,541	16,832	11,125	5,334	1,219	9,410 (2 yr.)	1,221	
Nitrate of potash	" "	-	-	-	8	70	39	56	
Nitrate of soda	" "	1,756	33	-	26	10	365	7,370	

Table 39 .- (Continued - 9)

	UNIT OF QUANTITY	1935	1936	1937	1938	1939	AVERAGE 1935-1939	1940	JAN.-SEPT., 1941
MISCELLANEOUS (Cont.)									
Fertilizers (Cont.)									
Chemical (Cont.)									
Phosphate of ammonia	Metric Tons	-	-	-	6,352	2,520	(2 yr.) 4,436	21,442	
Sulphate of ammonia	" "	34,405	46,983	35,933	29,674	32,702	35,939	51,549	
Sulphate of potash	" "	893	970	579	290	296	606	234	
Superphosphate	" "	1,279	757	748	655	434	775	509	
Other	" "	5,853	3,096	6,584	501	172	3,241	1,820	1
Bean oil cake	" "	660	1,023	926	1,010	1,156	955	724	162

Source: Data for 1935-1936 and some items of later years were taken from "Annual Report of the Insular Collector of Customs", 1934-36, 1938, 1940.

1937-1941 data compiled from "World Foodstuff Study", prepared by International Economics Unit, Department of Commerce, 1942.

1/ January-June, 1939

2/ Fiscal year, 1940

3/ In metric tons

a/ Liter (liquid) equals .26417 U. S. gallons.

z/ Less than 500 kilograms

N.R. Not reported

Table 40 .- FOREIGN TRADE: Exports of principal agricultural products, 1935-1940

Items	Unit of Quantity	1935	1936	1937	1938	1939	Average 1935-1939	1940
CEREAL PRODUCTS								
Rice	M.T.	2,632	465	2,051	293	74	1,103	102
ANIMAL								
Cattle	No.	91	-	272	2	53	84	30
Poultry & game	"	427	4	618	-	31	216	2,229
FRUITS								
Mango	M.T.	2,611	1,289	970	809	861	1,308	472
Pineapple, canned	"	1,197	3,798	10,959	8,911	14,189	7,811	18,774
FISH								
Dried, smoked,	"	272	276	280	297	165	258	135
Preserved, canned & other	"	147	63	93	441	758	300	770
COCONUT PRODUCTS								
Vegetable lard	"	1,350	3,348	1,567	1,467	1,688	1,884	1,949
Vegetable butter	"	,864	1,887	2,890	3,409	3,802	2,570	3,629
Copra	"	252,900	291,088	236,544	342,067	400,667	304,653	341,930
Coconut oil	"	164,186	158,908	162,768	165,057	167,638	163,711	185,902
Edible coconut oil	"	1,009	714	692	731	2,914	1,212	8,443
Dessicated coconut	"	33,968	33,713	40,745	34,277	41,747	36,890	40,518
Copra cake & meal	"	101,864	108,268	110,529	129,341	114,399	112,880	105,028

(Continued)

(2)

Table 40.- FOREIGN TRADE: Exports of principal agricultural products, 1935-1940

(Continued)

Items	Unit of Quantity	1935	1936	1937	1938	1939	Average 1935-1939	1940
SUGAR & SUGAR PRODUCTS								
Sugar	1,000 M.T.	516	900	871	868	875	806	977
Molasses & sirup	"	46	43	55	29	16	38	4 a/
Confectionery & candies	M.T.	34	34	67	56	45	47	30
Honey, coco	"	8	10	9	20	19	13	11
TOBACCO								
Leaf	"	22,413	14,442	8,076	9,838	16,495	14,253	12,222
Cigars	No. in 1,000	223,117	178,334	204,620	196,694	207,137	201,980	206,231
Cigarettes	"	16,273	17,144	34,959	89,697	28,665	37,348	136,559
Scraps & cigar ends	M.T.	1,482	1,068	3,277	1,936	5,696	2,692	2,482
FIBER								
Abaca	M.T.	188,201	167,124	165,339	141,315	177,828	167,961	177,444
Canton	"	5,073	5,819	3,871	1,357	1,215	3,467	1,189
Maguey	"	14,725	21,707	15,585	6,362	1,483	11,972	3,458
Kapok	"	696	1,003	1,129	528	1,157	903	231
Sisal	"	-	131	747	109 b/	245	308 c/ (4 yr.)	743
NUTS								
Betel nuts	"	43	13	17	18	28	24	47
Peanuts	"	7	114	807	2,063	2,900	1,178	2,306
Pili nuts	"	8	48	64	11	30	32	3
Other	"	124	213	226	137	157	171	2

(Continued)

(3)

Table 40 .- FOREIGN TRADE: Exports of principal agricultural products, 1935-1940

(Continued)

Items	Unit of Quantity	1935	1936	1937	1938	1939	Average 1935-1939	1940
MISCELLANEOUS								
Lumber & timber	Cu. meters	337,662	462,398	593,619	378,695	478,971	450,269	448,005
Hides & skins	M.T.	523	1,128	1,895	1,962	2,336	1,569	2,113

Source: Data for 1935-36 were compiled from "Annual Report of the Insular Collector of Customs," 1934-36 Manila, 1937.
Data for the other years taken from "Philippine Islands Trade, 1935-June, 1939" and "World Foodstuffs Study" prepared by Department of Commerce, as well as "Annual Report," 1938 and 1940.

a/ Molasses only
b/ January-June, 1939
c/ Fiscal year, 1940
M.T. = Metric Tons.

Table 41 .-FOODSTUFFS: An Estimate of the Supply of Cereals, Root Crops and Legumes Available from Local Production, Compared with Requirements Based on Average Consumption for the Philippines by Regions, 1938

Crop	Luzon: Ilocos-Mountain Region			Luzon: Cagayan Valley Region			Central Luzon+Zambales		
	Total 1/ Production	Available for Consumption		Total 1/ Production	Available for Consumption		Total 1/ Production	Available for Consumption	
		2/ Quantity	3/ Calories		2/ Quantity	3/ Calories		2/ Quantity	3/ Calories
	(Metric) tons	(Metric) tons	(Million)	(Metric) tons	(Metric) tons	(Million)	(Metric) tons	(Metric) tons	(Million)
Rice (Palay)	116,621	107,291	241,994	125,545	115,501	260,510	772,866	711,037	1,603,744
Corn	14,240	12,531	40,726	65,850	57,948	188,331	30,165	26,545	86,271
Sweet Potatoes	176,284	162,181	173,534	18,597	17,109	18,307	12,998	11,958	12,795
Cassava	2,775	2,470	2,821	1,009	898	1,026	10,105	8,994	10,271
Beans (Total)	1,503	1,413	4,945	1,250	1,175	4,112	3,801	3,573	12,505
Dry	858			420			733		
Mungo	572			768			3,010		
Soybeans	73			62			58		
Peanuts	449	413	1,617	1,154	1,062	4,147	2,469	2,271	8,871
Minor Root Crops (Total)	3,849	3,541	4,108	1,538	1,415	1,641	3,639	3,348	3,884
Tugue	1,177			464			1,606		
Gabe	1,807			808			1,590		
Ubi	757			241			399		
Arrowroot	2			19			34		
Potatoes	106			6			10		
Total	315,721		469,745	214,943		478,074	836,043		1,738,341
Requirement 5/			436,211 5/			233,908 5/			1,343,508, 5/
Balance 6/			33,534 6/ (surplus)			244,166 6/ (surplus)			394,833 (surplus) 6/
Rice Equivalent of Balance (Metric Tons) 7/			9,664 7/ (surplus)			70,365 7/ (surplus)			113,785 (surplus) 7/

Table 41 . (Continued - 2)

Crop	Southern Luzon Rice-Coconut Region			Southern Luzon Coconut-Abac Region			Panay		
	Total 1/ Production	Available for Consumption		Total 1/ Production	Available for Consumption		Total 1/ Production	Available for Consumption	
		2/ Quantity	3/ Calories		2/ Quantity	3/ Calories		Quantity	Calories
	(Metric) tons	(Metric) tons	(Million)	(Metric) tons	(Metric) tons	(Million)	(Metric) tons	(Metric) tons	(Million)
Rice (Palay)	107,223	98,645	222,493	100,169	92,155	207,857	187,429	172,435	388,928
Corn	8,284	7,290	23,693	3,806	3,349	10,884	13,296	11,701	38,028
Sweet Potatoes	2,679	2,465	2,637	19,547	17,983	19,242	7,660	7,047	7,540
Cassava	3,199	2,847	3,251	4,296	3,823	4,366	2,985	2,657	3,035
Beans (Total)	977	918	3,213	63	59	207	1,831	1,721	6,024
Dry	294			46			313		
Mungo	656			15			1,504		
Soybeans	27			2			14		
Peanuts	802	738	2,885	194	178	697	244	224	877
Minor Root Crops (Total)	2,106	1,937	2,247	1,688	1,553	1,801	2,570	2,364	2,742
Tugue	200			136			44		
Gabe	1,539			1,224			1,850		
Ubi	343			150			637		
Arrowroot	24			177			35		
Potatoes	.2			1			4		
Total	125,270		260,419	129,763		245,054	216,015		447,174
Requirement 5/			522,228 5/			461,027 5/			534,127 5/
Balance 6/			261,809 6/ (Deficit)			215,973 6/ (Deficit)			86,953 6/ (Deficit)
Rice Equivalent of Balance (M.Tons) 7/			75,449 7/ (Deficit)			62,240 7/ (Deficit)			25,059 7/ (Deficit)

Table 41. (Continued - 3)

Crop	Negros			Mindoro			Romblon		
	Total 1/ Production	Available for Consumption		Total 1/ Production	Available for Consumption		Total 1/ Production	Available for Consumption	
		2/ Quantity	3/ Calories		2/ Quantity	3/ Calories		2/ Quantity	3/ Calories
	(Metric) tons	(Metric) tons	(Million)	(Metric) tons	(Metric) tons	(Million)			
Rice (Palay)	69,929	64,335	145,109	19,990	18,391	41,480	4,568	4,203	9,480
Corn	52,681	46,359	150,667	758	667	2,168	466	410	1,333
Sweet Potatoes	5,078	4,672	4,999	429	395	423	821	755	808
Cassava	3,113	2,771	3,165	117	104	119	464	413	471
Beans (Total)	273	257	899	30	28	98	19	18	63
Dry	141			20			13		
Mungo	116			9			5		
Soybeans	16			1			1		
Peanuts	138	127	499	7	6	24	2	2	6
Minor Root Crops (Total)	2,213	2,036	2,362	145	133	154	293	270	313
Tugue	56			12			34		
Gabe	1,289			91			168		
Ubi	858			41			88		
Arrowroot	3			1			3		
Potatoes	7			-			-		
Total	133,425		307,700	21,476		44,466	6,633		12,474
Requirement 5/			482,968 5/			52,104 5/			39,352 5/
Balance 6/			175,268 6/ (Deficit)			7,638 6/ (Deficit)			26,878 6/ (Deficit)
Rice Equivalent of Balance (Metric tons) 7/			50,510 7/ (Deficit)			2,201 7/ (Deficit)			7,746 7/ (Deficit)

Table 41 (Continued - 4)

Crop	Cebu			Bohol			Samar		
	Total 1/ Production	Available for Consumption		Total 1/ Production	Available for Consumption		Total 1/ Production	Available for Consumption	
		2/ Quantity	3/ Calories		2/ Quantity	3/ Calories		2/ Quantity	3/ Calories
	(Metric) tons	(Metric) tons	(Million)	(Metric) tons	(Metric) tons	(Million)	(Metric) tons	(Metric) tons	(Million)
Rice (Palay)	3,466	3,189	7,193	30,455	28,019	63,196	43,636	40,145	90,546
Corn	53,323	46,924	152,503	13,201	11,617	37,755	3,327	3,327	10,813
Sweet Potatoes	4,206	3,870	4,141	11,483	10,564	11,304	29,223	26,885	28,767
Cassava	3,266	2,907	3,319	2,630	2,341	2,674	5,605	4,988	5,696
Beans (Total)	168	158	553	20	19	67	9	8	28
Dry	29			9			3		
Mungo	131			8			5		
Soybeans	8			3			1		
Peanuts	126	116	451	24	22	84	28	26	102
Minor Root Crops (Total)	2,028	1,866	2,165	2,081	1,915	2,221	3,304	3,040	3,527
Tugue	111			75			49		
Gabe	959			585			2,964		
Ubi	947			1,419			285		
Arrowroot	3			2			4		
Potatoes	8			.3			2		
Total	66,583		170,325	59,894		117,301	85,586		139,479
Requirement 5/			422,986 5/			194,689 5/			216,351 5/
Balance 6/			252,661 6/ (Deficit)			77,388 6/ (Deficit)			76,872 6/ (Deficit)
Rice Equivalent of Balance (Metric Tons) 7/			72,813 7/ (Deficit)			22,302 7/ (Deficit)			22,153 7/ (Deficit)

Table 41. (Continued - 5)

Crop	Palawan			Sulu			Batanes		
	Total 1/ Production	Available for Consumption		Total 1/ Production	Available for Consumption		Total 1/ Production	Available for Consumption	
		Quantity 2/	Calories 3/		Quantity 2/	Calories 3/		Quantity 2/	Calories 3/
	(Metric) tons	(Metric) tons	(Million)	(Metric) tons	(Metric) tons	(Million)	(Metric) tons	(Metric) tons	(Million)
Rice (Palay)	4,755	4,375	9,869	17,824	16,398	36,987	65	60	135
Corn	368	324	1,053	3,788	3,334	10,836	104	92	299
Sweet Potatoes	1,358	1,249	1,336	3,687	3,392	3,629	1,161	1,068	1,143
Cassava	1,147	1,021	1,166	110,925	98,723	112,745	1	1	2
Beans (Total)	18	17	60	10	9	32	.1	.1	4/
Dry	13			4			.1		
Mungo	4			6			-		
Soybeans	1			-			-		
Peanuts	2	2	6	238	219	853	-	-	-
Minor Root Crops (Total)	245	225	261	268	247	286	1,890	1,739	2,017
Tugue	6			31			282		
Gabe	134			108			31		
Ubi	94			128			1,577		
Arrowroot	11			-			-		
Potatoes	-			1			-		
Total	7,893		13,751	136,740		165,368	3,221		3,596
Requirement 5/			37,097 5/			97,864 5/			3,767 5/
Balance 6/			23,346 6/ (Deficit)			67,504 6/ (Surplus)			171 6/ (Deficit)
Rice Equivalent of Balance (Metric tons) 7/			6,728 7/ (Deficit)			19,453 7/ (Surplus)			49 7/ (Deficit)

Table 41. (Continued - 6)

Crop	Masbate			Marinduque			Leyte		
	Total 1/ Production	Available for Consumption		Total 1/ Production	Available for Consumption		Total 1/ Production	Available for Consumption	
		2/ Quantity	3/ Calories		2/ Quantity	3/ Calories		2/ Quantity	3/ Calories
	(Metric) tons	(Metric) tons	(Million)	(Metric) tons	(Metric) tons	(Million)	(Metric) tons	(Metric) tons	(Million)
Rice (Palay)	3,604	3,316	7,478	5,693	5,238	11,815	44,287	40,744	91,896
Corn	5,510	5,729	18,619	175	154	500	59,338	52,217	169,705
Sweet Potatoes	5,800	5,336	5,710	418	385	412	40,005	36,805	39,381
Cassava	4,006	3,574	4,081	124	110	125	2,533	22,254	2,575
Beans (Total)	21	20	70	17	16	56	48	45	158
Dry	8			6			13		
Mungo	10			10			32		
Soybeans	3			1			3		
Peanuts	38	35	138	6	6	24	137	126	493
Minor Root Crops (Total)	1,050	966	1,121	277	255	296	2,558	2,353	2,729
Tugue	28			21			82		
Gabe	310			99			1,815		
Ubi	711			73			655		
Arrowroot	-			84			-		
Potatoes	1			-			6		
Total	21,039		37,217	6,710		13,228	148,906		306,937
Requirement 5/			72,268 5/			32,382 5/			362,701 5/
Balance 6/			35,051 6/ (Deficit)			19,154 6/ (Deficit)			55,764 6/ (Deficit)
Rice Equivalent of Balance (Metric tons) 7/			6,728 7/ (Deficit)			5,520 7/ (Deficit)			16,070 7/ (Deficit)

Table 41 . (Continued - 7)

Crop	Mindanao			The Philippines		
	Total 1/ Production	Available for Consumption		Total 1/ Production	Available for Consumption	
		2/ Quantity	3/ Calories		2/ Quantity	3/ Calories
	(Metric) tons	(Metric) tons	(Million)	(Metric) tons	(Metric) tons	(Million)
Rice(Palay)	167,491	154,092	347,555	1,825,616	1,679,567	3,788,265
Corn	140,430	114,778	373,028	460,564	405,296	1,317,212
Sweet Potatoes	65,420	60,186	64,399	406,854	374,306	400,507
Cassava	10,956	9,751	11,136	169,266	150,647	172,044
Beans (Total)	367	345	1,207	10,425	9,799	34,297
Dry	186		~~3,109~~	3,109		
Mungo	159			7,020		
Soybeans	22			295		
Peanuts	469	431	1,683	6,527	6,004	23,457
Minor Root Crops (Total)	7,159	6,586	7,640	38,901	35,789	41,515
Tugue	207			4,621		
Gabe	5,731			23,102		
Ubi	1,144			10,547		
Arrowroot	40			442		
Potatoes	37			189		
Total	382,292		806,648	2,918,153		5,777,297
Requirement 5/			790,982 5/			6,336,520 5/
Balance 6/			15,666 6/ (Surplus)			559,223 8/ (Deficit)
Rice Equivalent of Balance (Metric tons) 7/			4,515 7/ (Surplus)			161,159 8/ (Deficit)

Table 41.-(Continued - 8)

1/ Calculated from data in Census of the Philippines, 1939, vol. II.

2/ The percentages to be deducted were estimated as follows:

Crop	Seed (Percent)	Feed and Waste (Percent)	Industrial Purposes (Percent)	Total (Percent)
Rice (Palay)	5	3	-	8
Corn	2	10	-	12
Sweet Potatoes	3	5	-	8
Cassava	-	6	5	11
Beans	3	3	-	6
Peanuts	6	2	-	8
Minor Root Crops	3	5	-	8

3/ Calory values used were:

	Per Metric Ton (Thousand)
Rice	3,470 a/
Corn	3,250
Sweet Potatoes	1,070
Cassava	1,403 b/
Beans (all kinds)	3,500
Peanuts	6,010 c/
Minor Root Crops	1,160 d/

Source: Except where otherwise noted, from "Tables of Food Composition Giving Proximate Mineral and Vitamin Components of Foods", Committee on Food Composition of the Food and Nutrition Board, National Research Council, Washington, D. C.

a/ For milled rice, which was obtained by multiplying palay x 65 percent.

b/ For edible product, which was obtained by multiplying weight of agricultural product by 81.4 percent. Source of calory and edible portion figures: The Cassava Industry in the Philippines, , Department of Agriculture and Commerce, Commonwealth of the Philippines, 1939.

c/ For edible portion, which was obtained by multiplying weight of agricultural product by 65 percent.

d/ Estimated average figure for agricultural product based mainly on the following calory values per kilogram for edible portions: Gabe - 1,430; Ubi - 1,390; Tugue - 1,260; (Source: Hermann, A. J., Food Values. Department of Agriculture and National Resources of the Philippines, Popular Bulletin no. 16, 1932.)

Table 41.- (Continued - 9)

4/ Less than .5 million calories.

5/ Based on average consumption of 1085 calories per person per day, calculated available for the Philippines, 1938, Arrived at as follows:

	Million Calories
Available from total production of the Philippines, 1938 ----------------------	5,777,297
Available from Net Imports --	560,675

Product	Quantity Imported				Quantity Exported (Average 1937-39)	Net Imports	Calories	
	1937	1938	1939	Average			Per M. Ton	Total
	(Metric) tons	(Metric) tons	(Metric) tons	(Metric) tons	(Metric) tons	(Metric) tons	(Thousand)	(Million)
Rice	74,001	9,379	83,633	55,671	806	54,865	3,470	190,382
Corn								
Grain	3	7	6,585	2,198	-	2,198	3,250	7,143
Starch	2,328	3,573	4,752	3,551	-	3,551	3,520	12,500
Wheat Flour	75,288	92,471	100,264	89,341	-	89,341	3,550	317,160
Beans (Mungo)	5,729	5,021	6,200	5,650	-	5,650	3,500	19,775
Irish Potatoes	10,936	11,824	10,069	10,943	-	10,943	720	7,879
Macaroni, Vermicelli, etc,	2,356	2,280	2,325	2,320	-	2,320	3,610	8,375
Peanuts	1,050	590	1,214	952	1,923	971	6,010	5,836
						(Net Export)	(Net Export)	(Net Export)
Total								560,675
Grand Total								6,337,972

Average available per person (16,000,303 population) - 1085 calories.per day.

Table 41.-(Continued - 10 -)

6/ The quantity available for consumption compared with requirements.

7/ $\frac{\text{Total Calories (thousand)}}{3.470}$ = metric tons of rice.

8/ This deficit was made up by imports. (See footnote 5 above.) These figures do not exactly coincide with those of footnote 5 because requirements were calculated on the basis of a round figure of 1085 calories per person per day, omitting decimal places.

Table 42 .- Conversion Factors for weights and measures commonly used in the Philippines.

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1 Cavan of palay (rough rice).....= 44 kilograms

1 Cavan of corn (maize).......... = 58 kilograms
(Sometimes given as 58.5 kilograms)

1 Picul .... = 63.25 kilos

1 Quintal of tobacco leaf .... = 46 kilograms
(The Spanish quintal is used for tobacco)

1 Hectare .... = 2.471 acres

1 Kilogram .... = 2.2046 lbs.

1 Metric ton .... = 2204.6 lbs.

1 Kilometre..................... = .62137 Mile

1 Sq. Kilometer .... = .3861 sq. mile

1 Liter .... = .26418 gallon.

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